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Implementation Plan for the Pre-Release B Testbed for the ECS Project

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Abstract

This document was prepared in response to the NASA's Statement of Work as attached to the ESDIS Project Configuration Change Request (CCR) Number 505-01-41-135. This CCR specifies replacement of TRMM Release A with a Pre-Release B Testbed for SSI&T of AM-1 and SAGE III instrument science software. Four DAAC sites are to be supported: GSFC, LaRC, EDC and NSIDC.

The main driver for the testbed is the need to support Science Software Integration and Test for AM-1 and SAGE III instruments until the operation of Release B.O. This Implementation Plan for the Pre-Release B Testbed (hereafter referred to as the "Testbed") identifies the components, functions and hardware configuration required for the Testbed. The document describes the implementation approach, site configurations, staffing and operations support of the Testbed that will be provided until Release B.O is operational.

Keywords: Testbed, Pre-Release B, integration, SSIT, SSI&T

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1. Introduction

1.1 Purpose

The purpose of this document is to describe the Testbed and present the plan for its deployment. The document describes the scope of Testbed functionality, AM-1 and SAGE III instrument SSI&T activities, site-specific hardware configurations that host the software, and the operations support planned for the Testbed.

1.2 Scope

The primary goal for the Testbed is to support AM-1 and SAGE III Science Software Integration and Test. The ECS Science Data Engineering Office has described the processing capabilities that are needed for the Testbed. The Testbed will contain a subset of the functionality originally planned for Release A (resources have been shifted to expedite Release B development), plus some limited additional capabilities that were planned for Release B. Section 2 delineates some operational workarounds that together with the testbed capabilities will satisfy the needs for Science Software Integration and Test (SSI&T) of the Version 1 science software.

The Testbed will be hosted at four DAAC sites; GSFC, LaRC, EDC, and NSIDC. To expedite availability and delivery of the Testbed, Release A hardware configurations are being retained wherever possible and the current Release A COTS baseline (revision levels of all COTs products) will continue to be the baseline for the Testbed.

Early external interface testing will not be performed using the Testbed at the DAAC. Since the Release B COTS baseline is different than the Testbed (with Release A baseline) DAAC; tests performed in the four DAAC Testbeds would still require extensive regression testing in Release B. For this reason, early external interface testing will be supported in the mini-DAAC at Landover with Release B hardware and software.

Formal verification tests of requirements will not be performed since the Testbed is not an operational release. Functional testing will be conducted on the capabilities of the Testbed using the existing test suites (modified as necessary from the Release A test cases). Testbed processing capabilities will be demonstrated using a set of test data generated by ECS Testbed deployment will only occur after successful demonstration (see Sections 4.0 and 5.3).

There are no formal documentation deliverables. However, the Testbed will need to be maintained until B.0 is operational. Thus, documentation and training needed to support Testbed operations at the four sites will be provided as needed (see Sections 9 and 10).

1.3 Testbed Drivers

The purpose of the Testbed is to support Instrument Teams (IT) and their DAACs in science software integration and test efforts. Functionality included in the Testbed is driven by the support activities that the ITs are expected to need during the life of the Testbed.

SSI&T will be supported at the GSFC, LaRC, EDC, and NSIDC DAACs for science software delivered by the ASTER, CERES, MISR, MODIS, MOPITT, and SAGE III Instrument Teams.

Table 1.3-1 lists the SSIT activities by instrument and site.

Table 1.3-1. Instrument Specific Support

Instrument	DAAC
ASTER	EDC
CERES	LaRC
MISR	LaRC
MODIS	NSIDC
MODIS	GSFC
MODIS	EDC
MOPITT	LaRC
SAGE III	LaRC

Table 1.3-2 lists Testbed capabilities identified by the ECS Science Data Engineering Office for SSI&T support. Some capabilities go beyond the scope of Release A. The intent is to support as many of the capabilities as possible with software and procedural workarounds. For this reason the demonstrations will include capabilities 1-4 and 8 which would have been available had Release A gone operational. The other capabilities will be tested but will not be part of the pre-deployment demonstration.

Table 1.3-2. Testbed Processing Capability*

Reference Number	Processing Capability
1	Acquire single data granules (HDF-EOS and non-HDF-EOS) each having a unique ESDT but the same temporal locality, where the temporal locality is commensurate with the processing period
2	Acquire multiple data granules (HDF-EOS and non-HDF-EOS) all having the same ESDT and different temporal localities that span or overlap the temporal locality of the output product
3	Produce and Insert single data granules (HDF-EOS and non-HDF-EOS) having same ESDT and temporal locality
4	Acquire data granules (HDF-EOS and non-HDF-EOS) based on temporal locality
5	Acquire multiple static granules having the same ESDT
6	Acquire multiple data granules (HDF-EOS and non-HDF-EOS) having the same ESDT and different temporal localities where at least one is outside the processing period by a known amount
7	Produce and Insert multiple output products each having a unique ESDT and using a unique Metadata Configuration File (MCF)
8	Produce & Insert multiple output products (HDF-EOS and non-HDF-EOS) having the same ESDT different temporal localities

*"Acquire" is defined as getting a data granule from the SSIT data store and making it available for input to the science processing software.

"Produce" is defined as executing the science software in order to create one or more data granules.

"Insert" is defined as placing a data granule into the SSIT data store such that it is available for subsequent acquire operations.

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2. Testbed SSI&T Support

2.1 Overview

Science data processing in the ECS will be performed using science software which is developed independently of ECS by Instrument Teams at their local Science Computing Facilities (SCFs). The science software may be developed on a variety of computer platforms using many versions of compilers and operating systems. The ECS Project allows the software to be coded in C, FORTRAN 77, Fortran 90, and Ada. All of this software must comply with ESDIS standards which include ANSI standards, sets of allowed functions, and required use of the ECS Science Data Processing (SDP) Toolkit libraries for functions such as file access, error handling, and process control. Using the science software in ECS requires that the software be ported to the Silicon Graphics, Inc. (SGI) platforms at the Distributed Active Archive Centers (DAACs), integrated with the DAAC version of the SDP Toolkit, and executed under control of the automated Planning and Data Processing System (PDPS).

2.1.1 General

SSI&T can be defined as the process by which science software developed by Instrument Teams (ITs) at local SCFs is tested and integrated into the ECS at the DAACs. The activities associated with SSI&T can be logically separated into two categories: pre-SSI&T and formal SSI&T.

Pre-SSI&T activities are those activities that do not require any of the ECS subsystems such as the PDPS. Inspection, standards checking, and building and running the science software with the SCF Toolkit are pre-SSI&T activities.

Formal SSI&T activities are those activities that require ECS subsystems. These activities involve populating the ECS databases and building the science software with the DAAC Toolkit. Such activities involve the actual integration and running of the software within the ECS.

2.1.2 Scope of SSI&T

SSI&T will be supported at the EROS Data Center (EDC), Goddard Space Flight Center (GSFC), Langley Research Center (LaRC), and National Snow and Ice Data Center (NSIDC) DAACs for science software delivered by the ASTER, CERES, MISR, MODIS, MOPITT, and SAGE III Instrument Teams. The period of support will begin when the ECS Testbed is deployed. The dates for deployment are shown in section 4.2.

SSI&T support covers activities starting with the delivery of the science software to the DAACs and follows through the integration of science software PGEs into the ECS Pre-Release B Testbed. It is envisioned that most of the ECS SSI&T integration support will be concluded by 1 September 1997. ECS sustaining engineering support, however, will continue through the end of life of the Testbed (currently projected to be December 1997). ECS SSI&T personnel will also continue to be available to assist in problem resolution through the end of life of the Testbed.

2.2 Testbed Capabilities

The primary focus of the Testbed will be SSI&T. Instrument Teams, with the support of the ECS and DAAC SSI&T personnel, will perform a sequence of activities for each delivered PGE. The goals of the SSI&T process are:

1. To ensure that the delivered PGEs conform to ESDIS Project standards;
2. To port the PGEs to computer platforms at the DAACs;
3. To integrate the PGEs with the DAAC version of the SDP Toolkit and execute them using the ECS PDPS; and
4. To verify that the data products and results are the same as those produced at the SCFs.

Section 2.2.1 presents a mapping of the ECS functions and capabilities to the sequence of SSI&T activities. Section 2.2.2 contains brief descriptions of processes, software tools, and procedures for each SSI&T activity listed in the previous section. Section 2.2.3 describes Testbed configuration issues. Issues concerning ancillary data support are in Section 2.2.4. The basic science data processing capabilities to be supported in the Testbed are described in detail in Section 2.2.5 along with any associated assumptions and limitations. Finally, Section 2.2.6 addresses remote access and data distribution.

2.2.1 SSI&T Activities and ECS Functions/Capabilities

Table 2.2.1-1 below lists SSI&T activities that will be supported in the Testbed mapped to ECS functions/capabilities. They have been separated into pre-SSI&T and formal SSI&T according to the definitions in section 2.1.1. The SSI&T Activity Numbers shown in the table below are referenced later in this section. The ECS Function IDs from the table below are mapped to Table 3.1-1, List of Functions/Capabilities for the Testbed.

Table 2.2.1-1. SSI&T Activities Mapped to ECS Functions/Capabilities

Activity Number	SSI&T Activity	ECS Functions/Capabilities	Function ID
Pre-SSI&T:			
1	Accessing the Delivered Algorithm Package (DAP).	FTP Media (4mm or 8mm)	FTP-1 MED-1
2	Inspection of DAP contents.	UNIX text editors SSIT Manager Printer	DPS-7
3	Review of delivered documentation.	Sun SSIT Manager GUI Document viewers (WABI, ghostview, Acrobat Reader, UNIX text editors) Printer	 DPS-7 N/A

Table 2.2.1-1. SSI&T Activities Mapped to ECS Functions/Capabilities (cont.)

Activity Number	SSI&T Activity	ECS Functions/Capabilities	Function ID
4	Placing of DAPs under configuration management.	Sun ClearCase and scripts (from M&O)	N/A
5	Checking of science software for standards compliance.	Sun SGI SSIT Manager GUI SSIT Tools (Prohibited Function Checker, PCF Checker, Prolog Extractor, File comparison tools) FORCHECK C, Fortran 90, and Ada SGI compilers	 DPS-7 DPS-7
6	Building of the science software into PGEs with the SCF Toolkit.	SGI Release A SCF Toolkit C, FORTRAN 77, Fortran 90, and Ada SGI compilers	 TKA-1
7	Running of the PGEs from the command line.	SGI	N/A
8	Collection of performance statistics for the PGEs.	SGI Rusage profiling (command line)	 N/A
9	Examination of output log files from PGE runs.	SGI UNIX text editors Printer	 N/A
10	Viewing of output products and comparison to delivered test data.	EOSView SSIT Manager hdiff (HDF command-line tool) HDF GUI File Comparison Tool ASCII File Comparison Tool Binary File Assistant Comparison Tool IDL	CLS-1 DPS-7
11	Reporting of science software problems.	DDTS (Distributed Defect Tracking System COTS)	N/A
12	Reporting of ECS problems.	DDTS	N/A
13	Collection of lessons learned.	Excel spreadsheet	N/A
Formal SSI&T:			
14	Registration of ESDTs.	Add new or /new version ESDTs. ESDT generation scripts	SDS-6
15A	Registration of the PGEs in the PDPS database.	Sun SSIT Manager GUI PGE registration tools Update PDPS/SSIT DB GUI	 DPS-7 DPS-7

Table 2.2.1-1. SSI&T Activities Mapped to ECS Functions/Capabilities (cont.)

Activity Number	SSI&T Activity	ECS Functions/Capabilities	Function ID
15B	Registration subscriptions for tst dynamic inputs and/or outputs that are input to downstream PGEs	Subscription Editor(command line interface)	PLS-4
16	Building of the science software into PGEs with the DAAC Toolkit.	SGI Release A DAAC Toolkit C, FORTRAN 77, Fortran 90, and Ada SGI compilers per Release A Baseline	TK-1
17	Inserting test data into the data store.	Insert PGE .exe tar file Insert static and dynamic test data granules	DPS-7
18A	Set up resource reservations for SSIT resources	PLANG (PLANNING) CI Resource Planning Workbench	PLS-3
18B	Submit individual Production Requests (Prs) to run single PGEs within PDPS	PLANG (Planning) CI Production Request Editor	PLS-1
18C	Create candidate plan to run PGE	PLANG (Planning)CI Planning workbench	PLS-2
18D	Activate plan	PLANG (Planning)CI Planning workbench	PLS-2
18E	Run PGE	PLANG (Planning) CI Subscription Manager Manage subscription Notification	PLS-5
		PRONG (Processing) CI: All functions except alternate processing depending on PGE exit codes	DP-1
		Job Management, Add/Modify/Cancel Jobs, Release Jobs	DPS-2
		AutoSys Scheduling COTS	DPS-3
		Resource Management Allocate/deallocate resources	DPS-4
		PGE Execution Management, Stage PGE, Execute PGE, Manage PGE execution, Generate Production History (PH)	DPS-5
		Data Management, Manage/Retain data on local disks, Stage/Destage science data products	

Table 2.2.1-1. SSI&T Activities Mapped to ECS Functions/Capabilities (cont.)

Activity Number	SSI&T Activity	ECS Functions/Capabilities	Function ID
19	Examination of output log files and Production History from PGE runs.	SGI UNIX text editors Printer QA Monitor	 DP-6
20	Viewing of output products and comparison to delivered test data.	QA Monitor SSIT Manager GUI Selections	DP-6 DP-7
21A	Using the Planning subsystem to plan PGE chains and activate plan .	PLANG (Planning) CI: Production Request Editor, Enter Production Request, Review/Modify PR, Generate DPRs for future and past data, Review/Modify DPR, Schedule PR and DPR, Generate Plans and Reports Production Planning Workbench, Allocate DAAC Resources to DPRs, Develop candidate plans, Activate Plan, Update Active Plan, Production Planning Timeline	PLS-1 PLS-2
21B	Run PGE chains	Same as 18E	Same as18E
21C	Examination of output log files and Production History from PGE runs.	SGI UNIX text editors Printer QA Monitor	DPS-6
21D	Viewing of output products and comparison to delivered test data	QA Monitor SSIT Manager GUI Selections	DP-6 DP-7
22	Ensuring consistency and correctness of output products.	ECS databases Tools/scripts for examining databases	N/A
23	Distributing data products to Instrument Teams.	FTP Media (4 or 8mm) manual	FTP-1 MED-1
24	Reporting of science software problems.	DDTS	N/A
25	Reporting of ECS problems.	DDTS	N/A
26	Collection of lessons learned.	Excel spreadsheet	N/A

2.2.2 Description of SSI&T Activities

The paragraphs below describe each of the SSI&T activities in more detail. Full descriptions of all SSI&T procedures will be documented informally in a document similar to DID 611 and in the revised "Green Book" (*Science Software I&T Operational Procedures*, 162-TD-001-002). A draft version of the "Green Book" will be available in early April 1997 with a final version available with the deployment of the Testbed. Also refer to *Software Developer's Guide to Preparation, Delivery, Integration and Test with ECS* (205-CD-002-003).

1: Acquiring the Delivered Algorithm Package (DAP) - The Testbed will support the delivery of science software from the Instrument Teams in the form of DAPs via electronic means (FTP) or physical media (4mm or 8mm tapes). Once delivered to SSI&T, the DAPs will be unpacked (using UNIX tar) onto disk.

2: Inspection of DAP contents - The inspection of the DAPs for completeness and correctness is defined by the DAACs and should be part of the DAAC/Instrument Team SSI&T agreements. Typical of this activity are checking that DAP contents match the packing list, checking that agreed-upon directory structures were employed, checking that locations of files and their dispositions are correct, and checking that all intended files and directories are present. Standard UNIX tools and document viewers will be used to accomplish this task.

3: Review of delivered documentation - The documentation accompanying a science software delivery is decided by the DAAC and agreed upon by the Instrument Team. Details and should be documented in the DAAC/Instrument Team SSI&T agreements. The *Software Developer's Guide to Preparation, Delivery, Integration and Test with ECS* (205-CD-002-003) should serve as a basis for defining required documentation.

Certain document viewers will be provided and supported in the Testbed. These include MS Word (via WABI) for MS Word or related documents, Acrobat Reader for PDF (portable document format) documents, ghostview for PostScript documents, Netscape browser for HTML (hypertext markup language) documents, and standard UNIX text editors/viewers for ASCII documents.

4: Placing of DAPs under configuration management - Delivered Algorithm Packages (DAPs) may be placed under configuration management using the ClearCase COTS according to DAAC/Instrument Team SSI&T agreements. M&O will be able to set up ClearCase VOBs (Versioned Object Bases) and accounts for use by Instrument Team and SSI&T personnel during SSI&T. Both command-line and GUI-based tools will be provided for using ClearCase. The capability to apply labels indicating the software readiness state will also be provided.

5: Checking of science software for standards compliance - Checking for standards compliance involves a number of activities and tools that will be provided in the Testbed. These tools include the Process Control File Checker for checking process control files; the Prohibited Function Checker for checking source files; the Prolog Extractor for

extracting prologs from source code; the FORCHECK COTS for checking FORTRAN 77 source code for ESDIS standards compliance; and the C, Fortran 90, and Ada compilers for checking C, Fortran 90, and Ada source code for ESDIS standards compliance.

6: Building of the science software into PGEs with the SCF Toolkit - Science software should be first built and tested using the SCF version of the SDP Toolkit. This activity involves building the PGEs according to documentation provided in the delivery and linking it with the SCF Toolkit provided at the DAAC. This activity will verify that the porting of science software from the development facility (SCF) to the DAAC was successful since it uses the same Toolkit available to the Instrument Teams.

7: Running of the PGEs from the command line - Once the science software has been built with the SCF Toolkit, it will be run from the UNIX command line on the SGI. Exact procedures for running the PGEs in this mode should be provided by the Instrument Teams in Operations Procedures/Test Plan documentation.

8: Collection of performance statistics for the PGEs - A number of performance statistics will have to be gathered for each PGE. These statistics will be used in populating the PDPS database when it comes time to register the PGEs. Such statistics include system time, maximum memory used, block input and output, and number of page faults. These statistics may be retrieved by building and running the PGE with the SCF Toolkit at the DAAC or they may be furnished by the Instrument Teams based on tests performed at the SCF. Obtaining these statistics from the platform at the DAAC is preferable since the PGEs will ultimately be run on this platform.

9: Examination of output log files from PGE runs - Once the PGE has completed a single run from the command line, the log files produced will be examined for any anomalous messages that may indicate problems. If error or warning messages do appear in the log files, SSI&T personnel will attempt to diagnose the problems. If problems are found in the ECS software or configuration, M&O will be informed. A non-conformance report (NCR) may be generated. If problems are detected in the science software, procedures from the DAAC/Instrument Team SSI&T agreements will be followed to address these problems and arrive at a solution.

10, 20: Viewing of output products and comparison to delivered test data - If the PGE runs to completion without error, the output products generated must be compared to those delivered. A suite of tools will be provided for file comparison. For HDF/HDF-EOS output products, several tools will be provided including *hdiff* (command line tool) and the HDF File Comparison Tool (GUI). For ASCII output products, the UNIX *xdiff* tool will be provided. For binary output products, a Binary File Difference Assistant Tool will be provided to assist SSI&T personnel in generating code to perform the comparison.

For data visualization, two tools will be provided. EOSView is a user-friendly GUI for creating 2-D displays from HDF-EOS files (Point, Grid, Swath) as well as the standard HDF files (SDS, VDATA, Image, Text); it has additional features such as thumbnail-panning, colorization, zooming, and animation. Interactive Data Language (IDL) will also

be provided. This is a COTS display and analysis tool. It is used to create 2-D, surface/terrain, and 3-D (volumetric) displays from binary, ASCII, and other formats in addition to standard HDF. IDL has additional features including flexible input/output, custom colorization, graphing/plotting, scripting, raster-math, geographic registration, map-projection transformations, and vector-map overlay.

11, 24: Reporting of science software problems - The capability for problem reporting of science software will be supported by the COTS PureDDTS (Distributed Defect Tracking System). How problem reports for science software are created and managed should be contained in the DAAC/Instrument Team SSI&T agreements. The DDTS COTS will be configurable by the DAACs.

12, 25: Reporting of ECS problems - Problems detected during SSI&T that are traced to ECS software/hardware will be reported and tracked by ECS through M&O using the COTS tool PureDDTS (a separate copy from what will be used for science software problem reporting). The status of problems will be made available to DAAC and Instrument Team SSI&T personnel.

13, 26: Collection of lessons learned - An important function of the Testbed will be to gather as many lessons learned as possible and feed them into ECS Release B or science software development, as appropriate. To facilitate this, an MS Excel spreadsheet will be configured and provided. It will be accessed through WABI on the Sun. The spreadsheet that will be provided at the start of SSI&T will be a "strawman"; DAACs and Instrument Teams will be able to re-configure according to their needs.

14: Registration of ESDTs - Based on interactions between ECS and the Instrument Teams over the past five months, ESDT descriptor files and Dynamic Link Libraries (DLLs) will be available in the Testbed. During SSI&T, a registration process using the ESDT Registration GUI tool will make the ESDTs known throughout the system. In order for a PGE to run within the PDPS, all input and output ESDTs will have to have completed this registration.

15: Registration of the PGEs in the PDPS database - Before a PGE can be run within the PDPS, it must be registered in the PDPS database. This involves populating the database with information about the PGE (the PGE profile) and about the input and output files it accesses. Several tools will be available for this purpose. Some are GUI-based; others are command line programs. As well, the subscriptions for the PGE test dynamic inputs and for the PGE outputs that are input to downstream PGEs must be registered.

16: Building of the science software into PGEs with the DAAC Toolkit - Science software must be built into PGEs using the DAAC version of the SDP Toolkit before they can be run within the PDPS. The procedures for this task will be identical to the building of the PGE with the SCF Toolkit with the exception that the PGE will be linked to the DAAC version of the Toolkit libraries.

17: Inserting test data into data store - Before running a PGE in the SSI&T environment at the DAAC, test input data needed by the PGE (both static and dynamic granules) must be Inserted. The PGE executable package itself (binary executable and any scripts) must also be Inserted. These activities will be accomplished via several command line tools that will be provided.

18: Running of the PGEs by submitting individual Production Requests (PRs) to run single PGEs within the PDPS - Once the PGE has been built with the DAAC Toolkit and the databases have been populated, the PGE can be run under the automated PDPS. As a first step, predecessor planning activities must be carried out: Resource reservations are set up for the DAAC resources using the Resource Editor GUI, the Production Request Editor will be used to submit a Production Request (PR) that results in a PGE being run once. The Production Editor has a GUI interface which Instrument Teams or SSI&T personnel will use to specify the name of the PGE to be run and a temporal range for which the PDPS will Acquire the input file(s) and execute the PGE to produce the output product(s) for the requested processing period. A candidate plan is prepared using the Planning Workbench GUI. The Production Planning Timeline may be viewed. Using the information supplied during the registration of the PGE with its associated files and the specified temporal range, PDPS plans individual Data Processing Requests (DPRs) for this PGE to satisfy the processing period. When running an individual PGE, the requested temporal range is such that only one DPR satisfies the production request. After the candidate plan is activated, as input data satisfying the DPR are available from the data store or on the PDPS processing area, PDPS runs the PGE. Upon success for running the PGE once, PRs can then be submitted over a longer temporal range depending on the number of test granules of input data available for the PGE. PDPS will generate more than one DPR to satisfy the longer temporal range and the PGE will be run for each DPR as the input data become available on the on the data store. For more details, see Activity 21 on PGE chains.

19: Examination of output log files and Production History from PGE runs - As in item 9, log files will be examined for any anomalous behavior. In addition, a Production History will be examined.

21: Using the Planning subsystem to run PGE chains - Once a number of individual PGE runs have been successfully tested, it will be possible to use the Planning capabilities to enter additional PRs, and develop more complex candidate plans for activation. This would result in more than one Data Processing Request (DPR) or, equivalently, more than one run of a PGE. Further testing involving the development and activation of production plans consisting of multiple PRs and interdependent PGEs (chaining) will also be possible for PGEs that have successfully completed the previous SSI&T steps. Instrument Teams will likely deliver test scenarios which involve chaining of several PGEs. A plan can be activated such that AutoSys runs several PGEs sequentially. Test output data files from previous runs of these PGEs will have to be cleaned from archives and staging areas to ensure successful run of chained PGEs.

22: Ensuring consistency and correctness of output products - Once a Production Request has been completed, output products generated by the PGEs will be Inserted to the data store. These products will then be selected through the Quality Assurance (QA) Monitor GUI. Instrument Teams or SSI&T may then visualize science data products directly by invoking EOSView from the QA Monitor GUI, or visualize or compare output products to the test output data through selections available under the SSIT Manager GUI. Any discrepancies uncovered by SSI&T personnel will be logged and results will be sent to the Instrument Teams for further action. The database tables on data store may also be checked for completion and accuracy.

23: Distributing data products to Instrument Teams - The Instrument Teams will be given the opportunity to validate the correctness of the output products generated during SSI&T. Delivery mechanisms supported for this flow of data will be FTP. The detailed procedures should be documented in the DAAC/Instrument Team SSI&T agreements. Also, see Section 2.2.6.

2.2.3 Testbed Configuration

This section discusses several issues concerning the configuration of the Testbed in preparation for the start of SSI&T. These issues are the configuration of Earth Science Data Types (ESDTs) (Section 2.2.3.1), the set up of user accounts for Instrument Teams (Section 2.2.3.2), and the configuration management of science software using ClearCase (Section 2.2.3.3).

2.2.3.1 Earth Science Data Types

For the Version 1 science software running in the Testbed, the ECS will build and test Earth Science Data Types (ESDTs). The process for building ESDTs requires significant interaction between ECS and the Instrument Teams or data providers. It is expected that this level of interaction will continue beyond the deployment of the Testbed.

Table 2.2.2.1-1 below lists the continuing activities associated with building and testing Version 1 ESDTs:

Table 2.2.2.1-1. ESDT Development Activities

Activity	Date
ECS builds ESDT descriptor files.	January 1997
ECS forwards ESDT descriptor files back to Instrument Teams/Data Providers for review and validation of entries.	February 1, 1997
Instrument Teams/Data Providers complete review of ESDT descriptor files.	February 22, 1997
ECS tests some representative ESDTs for each Instrument Team/Data Provider using the Testbed parser.	March 31, 1997
Instrument Teams/Data Providers provide ECS with sample product files with which ECS can further test ESDTs.	As available prior to formal SSI&T

2.2.3.2 User Accounts

Computer user accounts will be needed for Instrument Team and SSI&T personnel participating in SSI&T. The set up of user accounts should be conducted before the start of SSI&T and should be initiated by the Instrument Teams contacting the DAACs and following DAAC procedures. The creation and proper set up of user accounts will be done by DAAC personnel.

2.2.3.3 Set Up of ClearCase

The COTS tool ClearCase® will be used during SSI&T for the configuration management of science software delivered to the DAACs. Instrument Teams and DAACs should define their intended needs for ClearCase prior to SSI&T. These should include required ClearCase user accounts and parameters defining the Versioned Object Base(s) (VOBs) to be created. The creation and proper set up of ClearCase will be done by DAAC personnel.

2.2.4 Ancillary Data Support

Ancillary data required by science software should be provided by the Instrument Teams in their deliveries in the format expected by the software. The Testbed will not support the input of ancillary data from external agencies for use in Processing during SSI&T.

It is understood that ITs will not supply Digital Elevation Model (DEM) data. The current implementation of the Release A SDP Toolkit supports a set of generic ancillary access tools that include DEM data. These tools and the DEM data are part of the SDP Toolkit and will still be supported in the Testbed. Instrument Teams will not be required to supply their own DEM data for these standard tools.

2.2.5 Processing

Automated science data processing systems generally perform the functions of staging of input files from an archive for the processing software, executing the software, and archiving the data files produced with information sufficient for subsequent retrieval of the data. The ECS PDPS performs these functions by Acquiring input data using metadata associated with each data granule, staging the data in the PDPS processing area, executing the science software, and Inserting the data products into the archive using granule metadata supplied by the science software. Science software is packaged into executables called Product Generation Executives (PGEs). From information about the PGEs supplied by the Instrument Teams, the ECS SSI&T team has extracted a basic set of processing capabilities common to most of the software. These capabilities will be supported in the Testbed. This set is listed below in Table 2.2.5.1-1. Individual PGEs may and probably will require more than one of these capabilities. PGEs may be dependent on other PGEs and thus, they may be run in sequences or chains. The chaining capabilities for the Testbed are discussed in Section 2.2.5.2.

2.2.5.1 Supported Processing Capabilities

The only production rule available for science software in the Testbed PDPS is the retrieval of data granules based on temporal coverage. Table 2.2.5.1-1 below lists eight supported processing capabilities, with reference numbers, that are based on this production rule and will be supported in the Testbed.

Table 2.2.5.1-1. Supported Processing Capabilities*

Reference Number	Processing Capability
1	Acquire single data granules (HDF-EOS and non-HDF-EOS) each having a unique ESDT but the same temporal coverage, where the temporal coverage is commensurate with the processing period.
2	Acquire multiple data granules (HDF-EOS and non-HDF-EOS) all having the same ESDT and different temporal coverages that span or overlap the temporal coverage of the output product.
3	Produce and Insert single data granules (HDF-EOS and non-HDF-EOS) having same ESDT and temporal coverage.
4	Acquire data granules (HDF-EOS and non-HDF-EOS) based on temporal coverage.
5	Acquire multiple static granules having the same ESDT.
6	Acquire multiple data granules (HDF-EOS and non-HDF-EOS) having the same ESDT and different temporal coverages where at least one is outside the processing period by a known amount. Note that the capability of specifying an offset time when the PGE is registered is not available in the Testbed. A workaround is discussed in the paragraph following this table.
7	Produce and Insert multiple output products (HDF-EOS and non-HDF-EOS) each having a unique ESDT and using a unique Metadata Configuration File (MCF).
8	Produce and Insert multiple output products (HDF-EOS and non-HDF-EOS) all having the same ESDT and different temporal coverages.

*"Acquire" is defined as getting a data granule from the SSIT data store and making it available for input to the science processing software.

"Produce" is defined as executing the science software in order to create one or more data granules.

"Insert" is defined as placing a data granule into the SSIT data store such that it is available for subsequent acquire operations.

As noted in Table 2.2.5.1-1 above, capability 6 will require a workaround. The workaround is to enlarge the processing period of the PGE (when it is registered in the PDPS database) to encompass the temporal coverage of all needed input granules, including any that would have been outside the nominal processing period. Some manual staging of files may be necessary during this workaround to make the PGE perform correctly.

2.2.5.2 Supported Production Requests and PGE Chaining

The PGEs that can be successfully tested in a Production Request (PR) scenario (multiple runs of the same PGE) and in a PGE chaining scenario (single runs on interdependent PGEs) must have the following characteristics:

1. PGEs that output non-HDF-EOS files must use the SDP Toolkit to produce associated metadata ODL files (in the same manner that they are produced for HDF-EOS files). This is required for automated Insert of the data granules. PGEs that do not do this for their non-HDF-EOS output products (as well as their HDF-EOS output products), will require manual intervention, thus interrupting the chain. The minimum metadata required for non-HDF-EOS files is `ShortName`, `VersionID`, and (if the granule is to be retrieved by temporal query for some other PGE) `RangeDateTime`.

2. The PGE must not require input granules that are outside of the processing period by an *unknown* amount. For example, the PGE cannot retrieve an input granule that is simply the "latest." The delta time from the processing period time must be known. See caveat in Section 2.2.5.1.

3. The PGE must not require input granules based on any production rule other than time. For example, spatial (geographic) queries and other non-temporal metadata queries are not supported by the Testbed at the current time.

2.2.6 Remote Access and Data Distribution

Remote access refers to the capability for Instrument Team personnel to participate in the SSI&T process from remote locations such as their local SCFs. The only tools provided for remote access will be standard Telnet, FTP, and electronic mail. Detailed procedures for handling remote access must be decided upon between the Instrument Team and the relevant DAAC.

Data distribution of products generated during the SSI&T process can only be handled using FTP. Generated products will be Acquired to a staging area on local disk allowing an FTP push or pull to take place. DAAC/Instrument SSI&T agreements should address request and notification procedures and other details for how this task should be accomplished.

2.3 Instrument Team Specific Support

Table 2.3-1 following lists the specific support that ECS SSI&T personnel plan to provide for each of the Instrument Teams and DAACs during SSI&T. The information on PGEs and delivery dates is based upon the best available knowledge.

Table 2.3-1. SSI&T Support by Instrument Team and DAAC

Instrument	DAAC	Expected Number PGEs	Expected Delivery Date	Number ECS SSI&T Personnel
ASTER	EDC	5	6/9/97	1
CERES	LaRC	2	8/1/97	2
MISR	LaRC	3	6/20/97†	1
MODIS	GSFC	50	4/18/97†	4
MODIS	EDC	8	TBD	1
MODIS	NSIDC	6	TBD	1
MOPITT	LaRC	3	6/17/97	1
SAGE III	LaRC	2	6/20/97	1

† This date refers to the delivery date of the first of several transfer packages. Not all PGEs will be delivered on this date; others will follow at later dates.

2.4 Operational Support and Sustaining Engineering Support

The success of SSI&T in the Testbed will depend on the interaction of personnel from several key organizations involved in operational support. These key organizations are the Instrument Teams, DAACs, ECS Science Data Engineering (SDE) Office, and ECS Sustaining Engineering Organization (SEO). Each will contribute personnel in support of SSI&T.

Table 2.4-1 summarizes the roles and responsibilities for key SDE SSI&T activities. Section 7 builds on this table by providing a functional look at the underlying activities and describes the roles and responsibilities at each Testbed DAAC. Specific details may vary from DAAC to DAAC depending on DAAC Management.

Table 2.4-1. SDE Operational Support for SSI&T

Role Number	Category	ECS Science Data Engineering (SDE) Role
1	Planning	Participate in joint meetings of the Instrument Teams, DAACs, ECS SDE Office, and ECS SEO to develop time phased SSI&T goals, objectives, plans, tests, test data, and organizational responsibilities.
2	Logistics	Define and negotiate with the DAACs logistic needs including office space, storage, phones, fax, and terminals.
3		Define and negotiate with the DAAC personnel support requirements including user accounts, environment setup for SSI&T support, access to ClearCase VOBs, visit requests and badges.
5	Training	Participate with ECS M&O in SSI&T Training Courses for Instrument Teams and DAAC personnel.
6		Provide hands-on training to Instrument Teams and DAAC personnel in use of the Green Book for SSI&T in the Testbed.

Table 2.4-1. SDE Operational Support for SSI&T (cont.)

Role Number	Category	ECS Science Data Engineering (SDE) Role
4		Update and maintain the Green Book of Operational Procedures to implement SSI&T activities.
8		Support the DAAC SSI&T personnel in using the Green Book procedures to integrate and test delivered PGEs.
7	Execution	Maintain ESDTs for science data sets, update existing versions of ESDTs when needed for SSI&T, and create new ESDTs as needed.
9		Support workarounds for existing PGEs including manual staging and deletion of data files in the data store areas.
10		As time permits, support the DAAC SSI&T personnel in preparation and running of Test Scenarios including extended chaining of PGEs.
11	Fault Isolation	Support the Testbed Trouble Ticketing including entering TTs for ECS problems, tracking progress for fixes, and attending Sustaining Engineering Review Board meetings to provide information relevant to setting priorities for fixes.
12		Provide to appropriate organizations information relevant to solving problems and implementing fixes, estimates of nature and severity of problems, and effects on the Instrument Teams' schedules and plans.
13		For problems with ECS software, provide additional relevant information on problems from Instrument Teams, work with the software developers to fix the problems and implement any new features which were overlooked in planning for the Testbed.
14		Keep the Instrument Teams and DAACs informed on progress in solving the problems.
15		Modify code and support files for synthetic PGEs to test fixes or new features required in the Testbed.

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3. Testbed Functionality and Interface

3.1 Testbed Functionality

While the SSI&T process is a driver for Testbed required functionality, the Testbed is being created from a configured Release A system that was already undergoing integration.

A detailed list functional capabilities supplied by the Testbed can be found in Table 3.1-1. The Testbed will include the following components:

- Planning and Data Processing components that provide comprehensive SSI&T support including registering PGEs, setting up subscriptions for Planning, entering production requests, developing and activating a production plan, scheduling and monitoring jobs with the AutoSys COTS, managing PGE execution, archive to the data store, QA monitoring of products including use of EOSVIEW for visualization;
- Data Store components that will interface with the Planning and Data Processing components, support metadata validation, support subscription registration and notification, allow ESDT additions via a GUI interface;
- An "out-of-the-box" version of HP OpenView for monitoring hardware failures.

Table 3.1-1. List of Functions/Capabilities for Pre-Release B Testbed

Functionality	Integrated/Supported In Testbed	Function ID
Planning	**Production Request Editor** : Enter Production Request Review/modify PR Generate DPRs for future and past data Review/modify DPR Schedule PR, DPR Production Request Editor GUI Generate Plans and Reports	**PLS-1**
	Production Planning Workbench : Allocate DAAC Resources to Production Processing (DPRs) Develop Candidate Plan(s) according to Release A Production Rules Activate Plan Update Active Plan Production Planning Timeline	**PLS-2**
	Resource Planning Workbench: Resource Editor GUI	**PLS-3**
	Subscription Editor: Enter/withdraw subscriptions based on advertised events and services(static database only) (IOS Stubbed Version integrated)	**PLS-4**
	Subscription Manager : Manage Subscription Notification (monitor for data availability before submitting DPR)	**PLS-5**

Table 3.1-1. List of Functions/Capabilities for Pre-Release B Testbed (cont.)

Functionality	Integrated/Supported In Testbed	Function ID
Processing	**Job Management:** Add/Modify/Cancel Jobs Implement Job Dependencies Release Jobs	**DPS-1**
	AutoSys Scheduling (COTs) Manual Startup/Shutdown Full COTS functionality	**DPS-2**
	Resource Management: Allocate/deallocate resources	**DPS-3**
	PGE Execution Management: Stage PGE Execute PGE Manage PGE execution Generate Production History (PH)	**DPS-4**
	Data Management: Manage/retain data on local disks Stage/Destage science data products	**DPS-5**
	QA Monitor : Access Product Data Update DAAC QA Metadata Visualize Product Data	**DPS-6**
	SSIT Manager : Enter Subscriptions Register PGE Archive PGE .exe tar file Update PDPS/SSIT DB GUI SSIT Tools (prohibited function checker, PCF checker, binary file differences, HDF and HDF-EOS comparison tools, profiling)	**DPS-7**
Network	**Remote SSIT (H/W only)** Remote access to authorized users.	**ISS-1**

Table 3.1-1. List of Functions/Capabilities for Pre-Release B Testbed (cont.)

Functionality	Integrated/Supported In Testbed	Function ID
Data Store	**Insert Science Product** Science Product Browse QA Production History	**DS-1**
	Acquire any product - Production History	**DS-2**
	Query	**DS-3**
	Insert metadata into metadata inventory Validate metadata Acquire metadata	**DS-4**
	Update metadata Update QA metadata	**DS-5**
	Add new ESDTs via GUI	**DS-6**
	Update, status, delete, add subscriptions via GUI	**DS-7**
	Trigger subscriptions based on events	**DS-8**
Data Distribution	Data Distribution **Push** **Pull**	**FTP -1**
	Tape (4mm, 8mm) manual distribution	**MED-1**
CLS/IOS /DMS (CIDM)	**EOSView** All functions	**EOS-1**
	IOSI (Advertising Service- ADSRV CI) Stubbed version only - no functions	**IOS-1**

Table 3.1-1. List of Functions/Capabilities for Pre-Release B Testbed (cont.)

Functionality	Integrated/Supported In Testbed	Function ID
MSS	**Agent**	**MSS-1**
	Application error event logging to a local file	
	Standard application performance metrics initialization and logging	
	MDA	
	Error/event log browser	**MSS-2**
	Accountability	
	Only stub version integrated	**MSS-3**
	COTS Packages	
	HP OpenView - Hardware/Network monitoring without customization s/w	**MSS-4**
	DDTS - NCR tracking	
	ClearCase - Configuration Mgmt.	**MSS-5**
		MSS-6
Tool Kit	**Release A Toolkit**	**TKA-1**
	All functions	
	(IDL provided as COTs)	
CSS	**CSS Infrastructure**	**CSS-1**
	SUN - all functions except ACL Security	
	HP - all functions except ACL Security	
	SGI - only as needed for Testbed	
	Note: ACL - stubbed in	

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4. Implementation Approach

The guiding principle for Testbed implementation is to reuse as much of Release A as possible with minimum changes to the Release A configuration. ECS plans to use the same hardware configuration to host the Testbed at three out of four Testbed sites (GSFC, LaRC, EDC). It is possible to have the same hardware configuration at LaRC, and EDC. The NSIDC Testbed will require a scaled down configuration due to space limitations. The Testbed team will integrate, test, and demonstrate the Testbed's functionality at GSFC. The process of site configuration and demonstration will then be repeated at LaRC, EDC, and NSIDC. Using the same target system configuration (at three of four sites) helps avoid unnecessary testing and reduces the time required to activate each site.

As noted in Section 3, required functionality planned for the Testbed is driven by the processing capabilities needed for SSI&T of AM-1 and SAGE III instruments. CSS and MSS services implemented for Release A exceed what is needed to support the Testbed. Services not needed for the Testbed will be stubbed out. Planning and processing capabilities that are implemented for Release A and not needed for the Testbed will be left in the Testbed, but a lower priority will be given to their integration.

Testing will be conducted using a set of PGEs developed by ECS. The PGEs are built to exercise the Science Software interfaces with ECS (ECS Toolkit). Successful execution of the PGEs will establish the benchmark by which the actual Science Software Algorithms will be evaluated. ECS will endeavor to use a small sample of actual PGEs developed by ITs after the Testbed capabilities have been demonstrated successfully. Testing of PGEs received from ITs is subject to resources, schedules, and the availability of stable PGEs from an IT.

A detailed implementation schedule (Section 4) which includes interim milestones that will be used to manage the progress on a day-to-day basis. ECS will report progress to ESDIS weekly on the basis of this detailed schedule.

The NCR process will be essentially the same as that used for Release A. DDTS will be used to track NCRs written on the Testbed. NCRs that are currently open for Release A and are relevant to the Testbed will continue to remain active until closed. ECS does not plan to resolve every NCR prior to the fielding the Testbed. High priority NCRs (Category 1s and 2s) will be resolved first, followed by lower priority NCRs. Because the Testbed is not an operational release, ECS will use the NCR tracking system, but keep the rigor lower than that used for Release A.

4.1 Testbed Organization

The Testbed organization is attached in figure 4.1-1 and consist of a staff with people from Development, M&O, Science Data Engineering, and Test organization matrixed as needed to the Testbed organization.

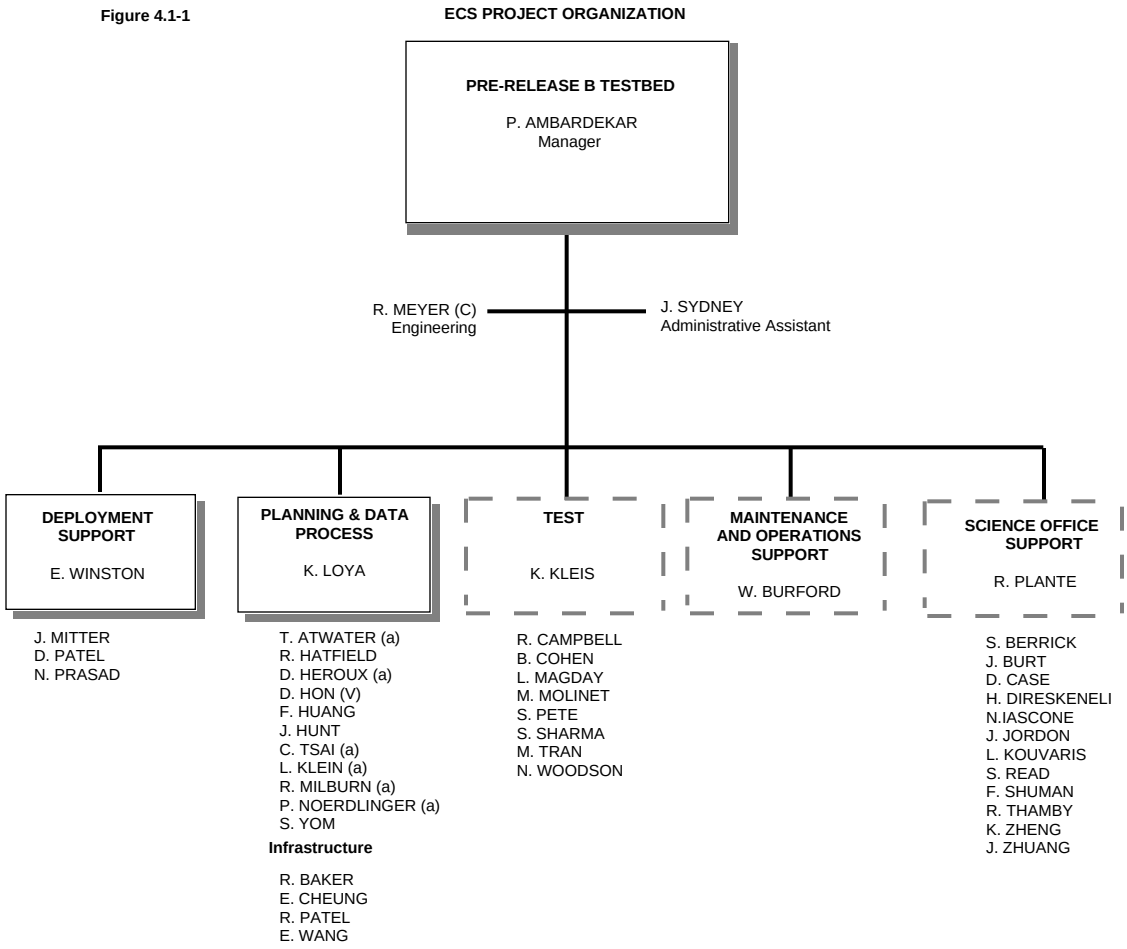
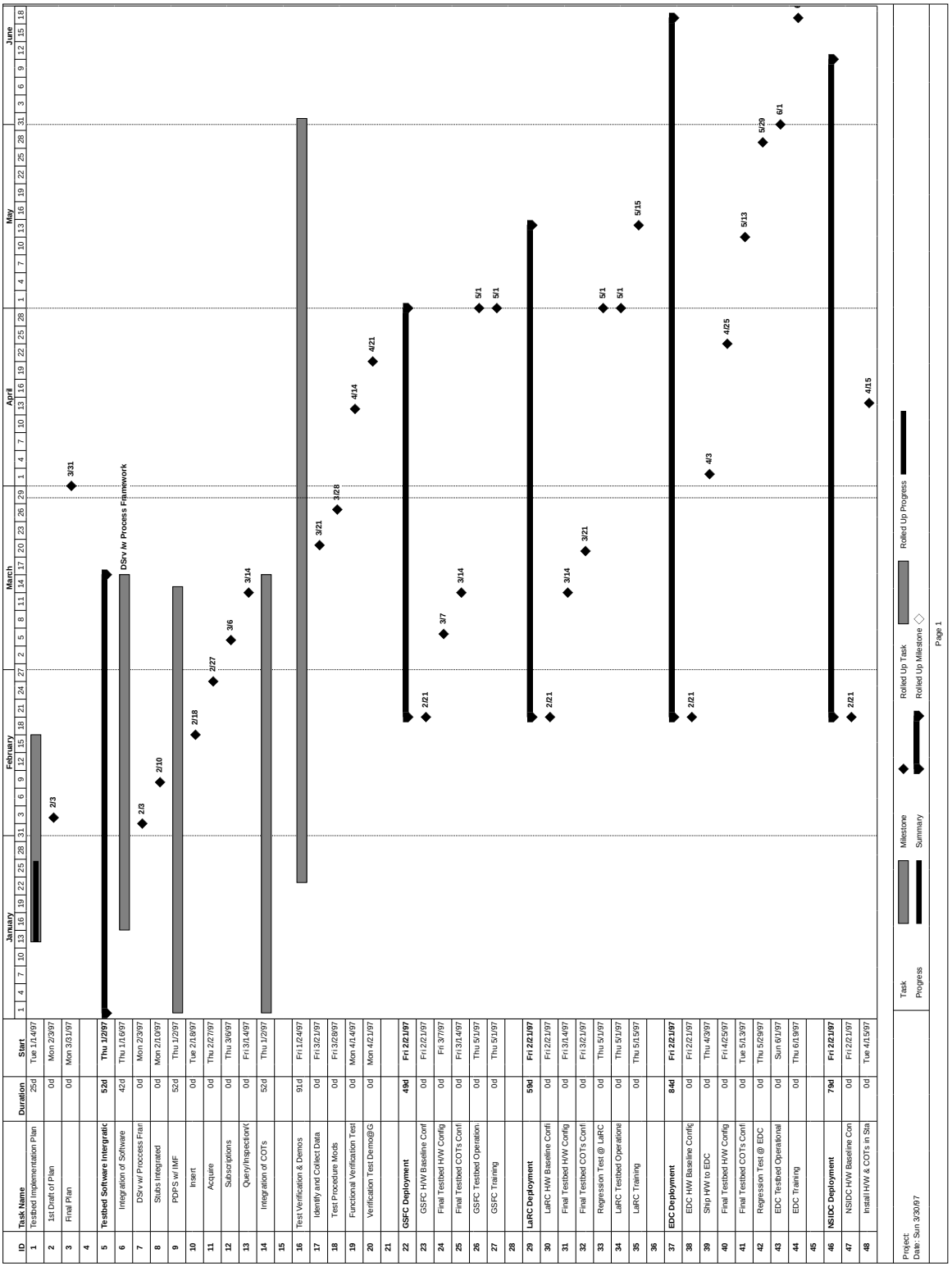


Figure 4.1-1. Testbed Development Organization

4.2 Schedules

The Testbed milestones and high level schedules are shown in Figure 4.2-1.



ID	Task Name	Duration	Start
1	Testbed Implementation Plan	25d	Tue 1/14/97
2	1st Draft of Plan	0d	Mon 2/3/97
3	Final Plan	0d	Mon 3/31/97
4			
5	**Testbed Software Integratic**	**52d**	**Thu 1/23/97**
6	Integration of Software	42d	Thu 1/16/97
7	DSrv w/ Process Fran	0d	Mon 2/3/97
8	Stubs Integrated	0d	Mon 2/10/97
9	PDPS w/ IMF	52d	Thu 1/23/97
10	Insert	0d	Tue 2/18/97
11	Acquire	0d	Thu 2/27/97
12	Subscriptions	0d	Thu 3/6/97
13	Query/Inspection\(	0d	Fri 3/14/97
14	Integration of COTs	52d	Thu 1/23/97
15			
16	Test Verification & Demos	91d	Fri 1/24/97
17	Identify and Collect Data	0d	Fri 3/21/97
18	Test Procedure Mods	0d	Fri 3/28/97
19	Functional Verification Test	0d	Mon 4/14/97
20	Verification Test Demo@G	0d	Mon 4/21/97
21			
22	**GSFC Deployment**	**49d**	**Fri 2/21/97**
23	GSFC H/W Baseline Conf	0d	Fri 2/21/97
24	Final Testbed H/W Config	0d	Fri 3/7/97
25	Final Testbed COTs Confi	0d	Fri 3/14/97
26	GSFC Testbed Operation:	0d	Thu 5/1/97
27	GSFC Training	0d	Thu 5/1/97
28			
29	**LaRC Deployment**	**59d**	**Fri 2/21/97**
30	LaRC H/W Baseline Confi	0d	Fri 2/21/97
31	Final Testbed H/W Config	0d	Fri 3/14/97
32	Final Testbed COTs Conf	0d	Fri 3/21/97
33	Regression Test @ LaRC	0d	Thu 5/1/97
34	LaRC Testbed Operationa	0d	Thu 5/1/97
35	LaRC Training	0d	Thu 5/15/97
36			
37	**EDC Deployment**	**84d**	**Fri 2/21/97**
38	EDC H/W Baseline Config	0d	Fri 2/21/97
39	Ship H/W to EDC	0d	Thu 4/3/97
40	Final Testbed H/W Config	0d	Fri 4/25/97
41	Final Testbed COTs Conf	0d	Tue 5/13/97
42	Regression Test @ EDC	0d	Thu 5/29/97
43	EDC Testbed Operational	0d	Sun 6/1/97
44	EDC Training	0d	Thu 6/19/97
45			
46	**NSIDC Deployment**	**79d**	**Fri 2/21/97**
47	NSIDC H/W Baseline Con	0d	Fri 2/21/97
48	Install H/W & COTs in Sta	0d	Tue 4/15/97

Figure 4.2-1. Testbed Milestones and High Level Schedules

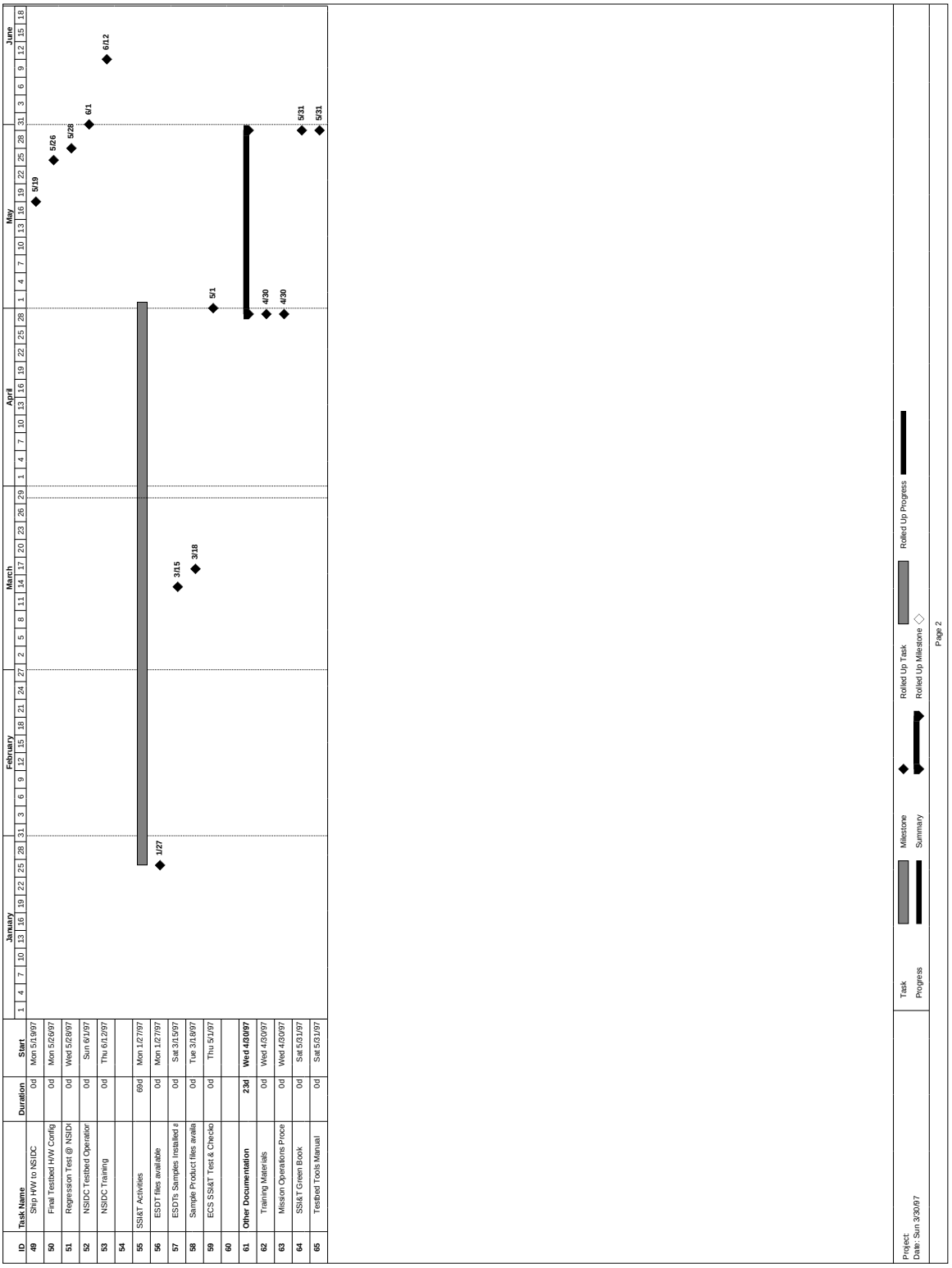


Figure 4.2-1. Testbed Milestones and High Level Schedules (cont.)

5. Test Verification Approach

5.1 Verification Approach

The Testbed will undergo functional integration testing to ensure that the software has been integrated and performs correctly. The Testbed's functionality will be verified by running tests that exercise the functions listed in Section 3.

5.2 Thread Testing

A subset of test threads and builds from the Release A Test Plan and Procedures Document will be used to verify the Testbed. These test threads exercise both the internal and external interfaces of the software. The tests will be updated as needed to document the specific aspects of the Testbed that differ from Release A, such as the test configuration, test data, etc. The tests will also be modified to include any necessary details from the Release A SSI&T Acceptance Test Procedures. Once completed, the test threads will be consolidated into a Testbed Test Plan and Procedures document. This document will be used for informational purposes only (it will not be under formal CCB control or adhere to current DID standards).

The Table 5.2-1 identifies the test threads from the Release A Test Plan and Procedures document that will be used to verify the Testbed.

Table 5.2-1. Testbed Threads Reuse from Release A Test Plan

Test Thread	Testbed Function	SSI&T Processing Capability #	Interface
TS070 Job Management 2/3	Manage DPRs jobs within AutoSys.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to end tests)	Process Framework Client
TS071 Report Generation GUI & Production Request Editor	Create/Delete Productions Requests and DPRs within the Testbed. Generate Reports from the database.	Capabilities 1, 2, 3, 4, 7 & 8 (Report Generation GUI)	Query data store for historic data Process Framework Client
TS050 Update Active Plan	Generate candidate plans.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to-end tests)	Process Framework Client

Table 5.2-1. Testbed Threads Reuse from Release A Test Plan (cont.)

Test Thread	Testbed Function	SSI&T Processing Capability #	Interface
TS052 Execution Manager	Used in conjunction with Job Management to perform AutoSys job execution.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to-end tests)	Process Framework Client Acquire Science s/w executable tar file/PGE (via Data Manager) Inspect metadata
TS066 Preprocessing 2/3	Access Toolkit to run the DPREP software.	Capabilities 1, 2, 3, 4 & 8 (used with DPREP s/w)	
TS067 Data Management 2/3	Used in conjunction with Job Management to stage/destage data.	Capability 3, 5, 6 & 7	Destage data Process Framework Client (Stage) data
TS068 Resource Management 2/3	Used in conjunction with Job Management to perform resource checking during AutoSys job execution.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to-end tests)	Process Framework Client
TS033 QA Monitor/Data Store Interface	Visualize HDF files and update QA metadata.	Capability 4, 7	Process Framework Client Acquire science granule and metadata Acquire browse file and metadata Acquire QA file and metadata Inspect metadata Acquire science granule and Production History Update metadata Query for all granules of an ESDT
TS045 SSIT Manager	Main GUI for invoking all SSI&T executables.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to-end tests)	Process Framework Client Acquire tar file Insert static/dynamic files Insert Science s/w .exes as tar file

Table 5.2-1. Testbed Threads Reuse from Release A Test Plan (cont.)

Test Thread	Testbed Function	SSI&T Processing Capability #	Interface
TS046 SSIT Data Store Interface	Acquires and Inserts SSI&T data products.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to-end tests)	Process Framework Client Acquire tar file Insert static/dynamic files Insert Science s/w .exes as tar file
TS047 PGE Database Update (SSI&T)	Loading database tables during PGE registration.	Capabilities 1, 2, 3, 4, 7 & 8 (Needed in end-to-end tests)	Process Framework Client
TS027 DPR Generation	Create production requests and DPRs	Capabilities 1,2,3,4,7 & 8	Process Framework Client
TS029 Data Subscription Management	Subscription Manager	Capabilities 1,2,3,4,7 & 8	Process Framework Client
TS032 QA Monitor GUI	Visualize HDF files	Capabilities 1,2,3,4,7 & 8	Process Framework Client
TS075 Resource Planning	Resource planning for job execution	Capabilities 1,2,3,4,7 & 8	Process Framework Client
BS015 SSI&T Build	Overall SSI&T capabilities	Capabilities 1,2,3,4,7 & 8	Process Framework Client
BS016 Science Data Processing & Archive Build	Exercises overall SSI&T capabilities in end-to-end scenarios. Includes details incorporated from appropriate acceptance test scenarios.		

5.3 Test Data

Synthetic PGEs and associated data will be used as test data for verifying the Testbed. The test data generated by ECS conforms to the guidelines provided by the Science Data Engineering group. Test data includes all necessary files, synthetic PGEs and ESDTs required to perform the testing. Table 5.3.1 identifies the synthetic PGEs that will be used to verify processing capabilities 1, 2, 3, 4, and 8 as identified in Table 2.2-1. These processing capabilities will be demonstrated to ESDIS prior to deployment of the Testbed. In addition testing with data and PGE's from the Instrument Teams will be considered only if correct data is available and there is no impact to the overall Testbed schedule.

Table 5.3-1. Synthetic PGEs and ESDTs

PGE Name	File Data Type	SSI&T Capability	Test Thread
DPREP	PREPHMN	3, 4	TS070 Job Management 2/3
	PREPHMH		TS071 Report Generation GUI & Production Request Editor
	PRATTITH		TS029 Data Subscription Management
	PRATTITN		TS027 DPR Generation
	FDFEPH_D		TS050 Update Active Plan
	TRML0HSK		TS052 Execution Manager
	PGEMISC		TS066 Ancillary Preprocessing 2/3
			TS067 Data Management 2/3 (Capability 3 only)
			TS068 Resource Management 2/3
			TS032 QA Monitor GUI
			TS033 QA Monitor/Data Store Interface (Capability 4 only)
			TS045 SSI&T Manager
			TS046 SSI&T Data Store (IMF) Server Interface
			TS047 PGE Database Update (SSI&T)
			TS075 Resource Planning
			BS015 SSI&T Build
			BS016 Science Data Processing & Archive Build

Table 5.3-1. Synthetic PGEs and ESDTs (cont.)

PGE Name	File Data Type	SSI&T Capability	Test Thread
CERES1aT	CERX00aa	1, 8	TS070 Job Management 2/3
	CERX01aT		TS071 Report Generation GUI & Production Request Editor
	CERX01bT		TS029 Data Subscription Management
	CERX01T		TS027 DPR Generation
	CER09T		TS050 Update Active Plan
	PGEMISC		TS052 Execution Manager
			TS066 Ancillary Preprocessing 2/3
			TS068 Resource Management 2/3
			TS032 QA Monitor GUI
			TS045 SSI&T Manager
			TS046 SSI&T Data Store Interface
			TS047 PGE Database Update (SSI&T)
			TS075 Resource Planning
			BS015 SSI&T Build
			BS016 Science Data Processing & Archive Build

Table 5.3-1. Synthetic PGEs and ESDTs (cont.)

PGE Name	File Data Type	SSI&T Capability	Test Thread
CERES12aF	CERX10	1, 2	TS070 Job Management 2/3
	CERX11		TS071 Report Generation GUI & Production Request Editor
	CERX12		TS029 Data Subscription Management
	CERX13		TS027 DPR Generation
	CERX06R		TS050 Update Active Plan
	PGEMISC		TS052 Execution Manager
			TS066 Ancillary Preprocessing 2/3
			TS068 Resource Management 2/3
			TS032 QA Monitor GUI
			TS045 SSI&T Manager
			TS046 SSI&T Data Store Interface
			TS047 PGE Database Update (SSI&T)
			TS075 Resource Planning
			BS015 SSI&T Build
			BS016 Science Data Processing & Archive Build

5.4 Test Methodology

Test processes followed for Release A will be adhered to as appropriate for verifying the Testbed functionality. For example, configuration management and problem resolution will be managed via ClearCase and DDTS, respectively, and test folders will be maintained by the testers that identify redlined test procedures, results and status.

5.5 Demonstrations

Informal demonstrations will be given to ESDIS as major functions of the Testbed are verified. A final demonstration will be presented following the successful integration and test of the Testbed in its entirety. This final demonstration will consist of running a subset of tests that exercise the major capabilities of the software. Verification at LaRC, EDC, and NSIDC will consist of running this same subset of tests to verify installation and functionality at each site.

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6. Deployment of Hardware at DAAC Sites

The Testbed will be installed and configured at four DAAC sites namely GSFC, LaRC, EDC and NSIDC. The following sections survey hardware that will be installed and configured as part of Testbed at all four sites.

6.1 Drivers

The following driving factors determine the reallocation of existing hardware at GSFC and LaRC to the new sites and also minimize risk for deployment:

- Minimize any disruption to I&T activities in progress at GSFC
- Avoid reconfiguration of infrastructure components (e.g. DCE cell, etc.) at GSFC and LaRC already installed and configured prior to Release A redirection
- Avoid reconfiguration of core Testbed components (e.g. Planning, and Processing) at GSFC and LaRC
- All four DAACs will have similar platform configurations to minimize deployment problems. Network configurations, however, are site specific
- At EDC, existing Ir1 hardware will be reused and configured as part of the Testbed

6.2 Infrastructure and Network Architecture

The Release A CSS DCE cell architecture configuration will be reused for the Testbed. The Testbed at all four sites will be configured into a single DCE cell. The cell services and administration will be controlled from the SMC CSS server (not shown). The Testbed will reuse the network already installed and configured at GSFC and LaRC. However, EDC and NSIDC require a network infrastructure to be installed and configured to support the Testbed. The following sections describe the network architecture for EDC and NSIDC.

EBnet will provide address space for assigning IP addresses to all IP addressable devices on the network. The ECS router will handle route exchanges with external networks (campus, NSI and V0) except for EBnet. The EBnet router has direct connectivity to the Testbed network and will handle all routing with other DAACs and facilities such as the LPS.

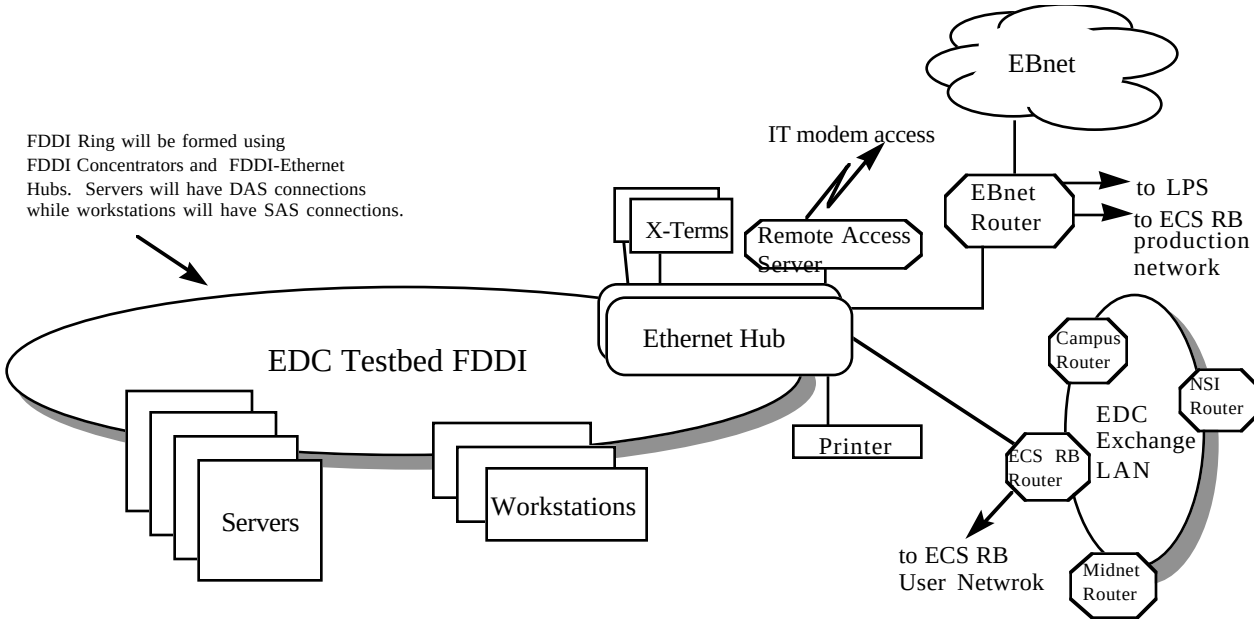
6.2.1 EDC

The Testbed LAN architecture is illustrated in Figure 6.2-1. The network has both FDDI and Ethernet segments. The FDDI ring is made up of several concentrators and Ethernet-to-FDDI Hubs. Servers will have dual attached station interfaces (DAS) while workstations will have single attached station (SAS) interfaces on the FDDI network. Printer, X-terminal and terminal server connectivity will be via the Ethernet hubs. External connections (to NSI, Campus and V0)

will be done via the Ethernet hub and an Ethernet interface on the Release B ECS router. The EBnet router will have a direct connection to the Ethernet hub via its Ethernet interface (Landsat access will be via this interface). Note that there will be two Ethernet hubs one of which would come from the existing Ir1 network. This will assure the availability of a backup hub in case one fails (external connections are dependent on the hubs).

6.2.1.1. Addressing and Routing

EBnet will provide address space for assigning IP addresses to all IP addressable devices on the network. The ECS router will handle route exchanges with external networks (campus, NSI and V0) except for EBnet. The EBnet router has direct connectivity to the Testbed network and will handle all routing with other DAACs and facilities such as the LPS.



EDC

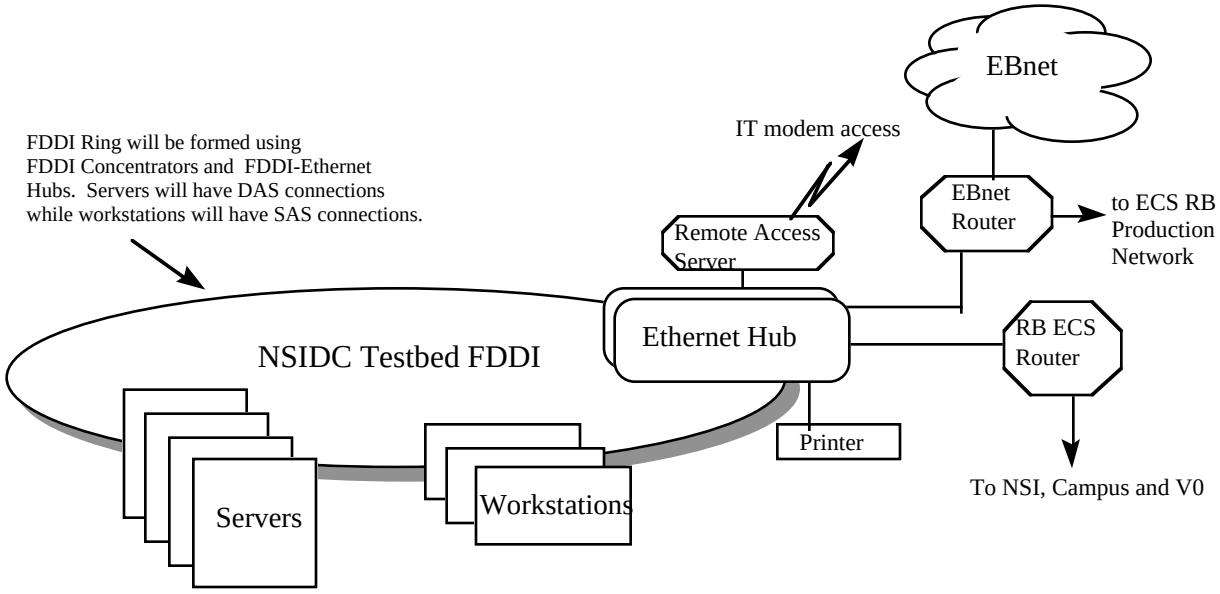
Figure 6.2-1. EDC Network Architecture

6.2.2 NSIDC

The Testbed LAN architecture is illustrated in Figure 6.2-2. The network has both FDDI and Ethernet segments. The FDDI ring is made up of several concentrators and Ethernet-to-FDDI Hub. Servers will have dual attached station interfaces (DAS) while workstations will have single attached station (SAS) interfaces on the FDDI network. Printer, X-terminal and terminal server connectivity will be via the Ethernet hub. External connections (to NSI, Campus and V0) will be done via the Ethernet hub and an Ethernet interface on the Release B ECS router. The EBnet router will have a direct connection to the Ethernet hub via its Ethernet interface. Note that there will be two Ethernet hubs. This will assure the availability of a backup hub in case one fails (external connections are dependent on the hubs).

6.2.2.1 Addressing and Routing

Part of the RB address space provided by EBnet will be used for assigning IP addresses to all IP addressable devices on the network. The ECS router will handle route exchanges with all external networks (campus, NSI and V0) except for EBnet. The EBnet router has direct connectivity to the Testbed network and will handle all routing with other DAACs and facilities.



NSIDC

Figure 6.2-2. NSIDC Network Architecture

6.3 Hardware Allocation to DAAC Sites

Table 6.3-1a-d illustrate the proposed Testbed hardware at GSFC, LaRC, EDC and NSIDC, respectively.

Table 6.3-1a. Testbed Hardware at GSFC

Subsystem	Function	Type	Make	Model	Number
Processing	Science Processor	Computer	SGI	Power Challenge	1
	Science Processing disk	RAID	SGI	C L Vault	-
	Virtual data store archive (IMF)	RAID	SGI		-
	Tape stacker	8mm			2
	Tape drive	4mm	SGI		1
	Tape stacker	4 mm			1
	X terminal	Terminal	NCD	HMX-PRO	2
	SSI&T WS	Computer	Sun	Sparc 20/50	1
	SSI&T DBMS Server	Computer	Sun	Sparc 20/50	1
	SSI&T Printer	Printer	HP	Laser Jet 4M+	1
Planning	Planning Server	Computer	Sun	Sparc 20/71	1
	Planning WS	Computer	Sun	Sparc 20/50	1
	Planning Disk	RAID	Sun	Sparc 20/712	1
MSS	MSS Server	Computer	HP	J210	1
	CM Server	Computer	SUN	Sparc 20/71	1
	MSS Printer	Printer	HP	Laser Jet 4M+	
	MSS WS	Computer	SUN	Sparc 20/50	1
	Shared RAID	RAID	HP		-
CSS	CSS Server	Computer	HP	J210	1
Infrastructure	NFS Server	Computer	SGI	Challenge L	1
	NFS disk	RAID	SGI		-
	Staging disk for CM builds	Disk	Sun		-

Table 6.3-1b. Testbed Hardware at LaRC

Subsystem	Function	Type	Make	Model	Number
Processing	Science Processor	Computer	SGI	Power Challenge	2
	Science Processing disk	RAID	SGI	C L Vault	-
	Virtual data store archive (IMF)	RAID	SGI		-
	X Terminal	Terminal	NCD	HMX-Pro	5
	Tape stacker	8 mm			1
	Tape drive	4 mm	SGI		1
	SSI&T WS	Computer	Sun	Sparc 20/50	1
	SSI&T DBMS Server	Computer	Sun	Sparc 20/50	
	SSI&T Printer	Printer	HP	Laserjet 4M+	
Planning	Planning Server	Computer	Sun	Sparc 20/71	1
	Planning WS	Computer	Sun	Sparc 20/50	1
	Planning Disk	RAID	Sun		-
MSS	MSS Server	Computer	HP	J210	1
	CM Server	Computer	SUN	Sparc 20/50	1
	MSS WS	Computer	SUN	Sparc 20/50	1
	Printer		HP	Laser Jet 4M+	1
	Shared RAID	RAID	HP		-
CSS	CSS Server	Computer	HP	J210	1
Infrastructure	NFS Server	Computer	SGI	Challenge L	1
	NFS Disk	RAID	SGI		-
	Staging disk for CM builds	RAID	Sun		-

Table 6.3-1c. Testbed Hardware at EDC

Subsystem	Function	Type	Make	Model	Number
Processing	Science Processing	Computer	SGI	PC	1
	X terminal	Terminal	NCD	HMX-PRO	1
	Science Processor Raid	Raid	SGI		-
	Tape stacker	8 mm			1
	Tape drive	4 mm	SGI		1
	SSIT WS	Computer	Sun	Sparc 20/50	1
	SSIT WS & DBMS Servers	Computer	Sun	Sparc 20/50	1
	SSIT Disk Array	Disk	Sun		-
	Printer		HP	LaserJet 4M+	1
Planning	Planning Workstation	Computer	Sun	Sparc 20/50	1
	Planning & Queuing Server	Computer	Sun	Sparc 20/712	1
	Planning RAID	RAID	Sun		-
MSS	CM Server	Computer	Sun	Sparc 20/50	1
	Printer		HP	Laser Jet	1
	MSS WS	Computer	SUN	Sparc 20/712	1
	MSS Server	Computer	HP	J210	1
	Shared RAID	RAID	HP		-
CSS	CSS Server	Computer	HP	J210	1
Infrastructure	NFS Server	Computer	SGI	Challenge XL	1
	NFS RAID	RAID	SGI		-
	Staging disk for CM builds	RAID	Sun		-

Table 6.3-1d. Testbed Hardware at NSIDC

Subsystem	Function	Type	Make	Model	Number
Processing	Science Processing	Computer	SGI	Indigo Impact	1
	Science Processor file server	Computer	SGI	Challenge S	1
	Science Processor file server terminal	Terminal	WYSE		1
	Science Processor file server disk	Disk array	SGI	C L Vault	-
	Virtual data store archive (IMF)	RAID	SGI		-
	Tape drive	4 mm	SGI		1
	Tape stacker	8 mm			1
	SSI&T DBMS server	Computer	Sun	Sparc 20/50	1
	SSI&T WS	Computer	Sun	Sparc 20/50	1
	SSI&T server disk array	Disk	Sun		-
	Printer		HP	Laser Jet 4M+	1
MSS	MSS server	Computer	HP	J210	1
	MSS WS	Computer	Sun	Sparc 20/50	1
	MSS CM server	Computer	Sun	Sparc 20/50	1
	Shared RAID	RAID	HP		-
CSS	CSS server	Computer	HP	J210	1
Infrastructure	NFS disk	RAID	SGI		-
	Staging disk for CM builds	RAID	SUN		-

Figures 6.3-1a-d illustrate the hardware at GSFC, LaRC, EDC and NSIDC, respectively.

6.4 COTS Mapping to Hardware Platforms

The scope of the Testbed is significantly smaller than that of the original Release A. In the interest of schedule, it was decided not to remove extraneous COTS software (i.e., COTS not needed by the Testbed functionality) from those site configurations which have already been configured (GSFC and LaRC). However, only the COTS required by the Testbed is part of the official delivery. This software includes the following items:

- Operating systems and libraries
- SNMP agent
- DCE servers and libraries
- OODCE libraries
- RogueWave libraries
- NCSA HDF
- motif
- x11
- Science and ECS software development tools (compilers, editors, linkers, pure coverage, softbench, etc.)
- Office automation tools (WABI/office, zmail)
- Viewing tools (Adobe Acrobat, Ghostview, Netscape browsers) IDL
- IMSL
- Sybase clients and servers
- SQR Workbench
- SQS
- ClearCase
- Autosys and Autoxpert
- DDTS
- HP OpenView

Use of any other COTS configuration items which may be present on delivered platforms is at the DAAC M&O discretion and not subject to the delivery, test, configuration audit, maintenance and any other requirements which apply to the COTS which is part of the Testbed.

Tables 6.4-1 classify various COTS into categories to simplify illustration of COTS mapped to individual platforms. Tables 6.4-2a-d illustrate the mapping of COTS products supported by the Testbed on to host platforms at GSFC, LaRC, EDC and NSIDC, respectively.

Table 6.4-1. COTS Categories

COTS Categories	COTS
Infrastructure	Operating system, DCE client, oodce libraries (except Irix), SNMP agent, sybase client (xalib, dblib, ctlib using dbtools.h++), tool.h++, dbtools.h++, Legato networker client, motif, X11r5
Security	TCPWrapper, Tripwire
SSI&T compilers	Platform specific C, platform specific F77, platform specific F90, NAG F90
SSI&T Tools	zmail, ddts (AIT copy), FORCHECK, Ghostview, emacs, Adobe acrobat, Netscape browser, WABI, XEDIT, enscript, NCSA mosaic
GUI support tools	bx, graphpak, epak
Office tools	WABI/Office, Netscape browser, zmail
Custom software compiler	Platform specific C, platform specific C++
Development	Platform specific development environment (e.g. Sun Sparcworks, HP Softbench, SGI Casevision), dce toolkit

Table 6.4-2a. COTS Mapping to Hardware Platforms at GSFC

Testbed Host Platform at GSFC	COTS
SPRHW-GSFC-1	Infrastructure, clearcase client (point to MSS-CM server), SSI&T and custom software compilers, CaseVision, NCSA HDF, GUI support tools, IDL,IMSL pure coverage, security software, kftp, kerberos client, Legato Networker server autosys remote agent
AITHW-GSFC-1 (AIT WS)	Infrastructure, custom software compilers, development environment, GUI support tools, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF
AITHW-GSFC-2 (AIT DBMS server)	Infrstructure, custom software compilers, development environment, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF Sybase SQL server for PDPS database, Sybase SQL server for autosys DB

Table 6.4-2a. COTS Mapping to Hardware Platforms at GSFC (cont.)

Testbed Host Platform at GSFC	COTS
PLNHW-GSFC-1 (Planning WS)	Infrastructure, security, Autosys, AutoXpert,
PLNHW-GSFC-2 (planning & queuing server)	Infrastructure, custom software compilers, development, GUI support tools, clearcase client (point to krypton), sybase SQL server for autosys DB, net.h++#, dce dev tlkt, office, Autosys, AutoXpert, pure coverage, PDPS DB, Autosys DB, NCSA HDF, netscape commerce server
MSS-GSFC-1 (CM server)	Infrastructure, Security, clearcase server, Clearcase VOB server , IQ report writer, license server
MSS-GSFC-3 (MSS WS)	Infrastructure, Security, DDTS, office tools, clearcase view server
MSS-GSFC-4 (MSS server)	Infrastructure, security, DCE time server, GUI support tools, Office, custom compilers, development, essm, HPOV (out-of-the -box), pure coverage, perl5, clearcase client (point to krypton), custom software compilers
CSS-GSFC-1 (CSS server)	Infrastructure, dce (Replicate Directory, Security and Time servers), security, net.h++, DNS slave for GSFC, NIS slave
ACMHW-GSFC-2 (NFS server)	Infrastructure, security, NFS server, DNS master mail server for GSFC, NIS master, license server

Table 6.4-2b. COTS Mapping to Hardware Platforms at LaRC

Testbed host platform at LaRC	COTS
SPRHW-LaRC-5,6	Infrastructure, clearcase client (point to MSS-CM server), SSI&T and custom software compilers, CaseVision, NCSA HDF, GUI support tools, IDL,IMSL pure coverage, security software, kftp, kerberos client, Legato Networker server autosys remote agent
AITHW-LaRC-1 (SSIT WS)	Infrastructure, custom software compilers, development environment, GUI support tools, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF
AITHW-LaRC-2 (SSIT DBMS server)	Infrstructure, custom software compilers, development environment, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF Sybase SQL server for PDPS database, Sybase SQL server for autosys DB
PLNHW-LaRC-2 (Planning WS)	Infrastructure, security, Autosys, AutoXpert,
PLNHW-LaRC-1 (planning & queuing server)	Infrastructure, custom software compilers, development, GUI support tools, clearcase client (point to krypton), sybase SQL server for autosys DB, net.h++, dce dev tlkt, office, Autosys, AutoXpert, pure coverage, PDPS DB, Autosys DB, NCSA HDF, netscape commerce server
MSS-LaRC-3 (CM server)	Infrastructure, Security, clearcase server, Clearcase VOB server , IQ report writer, license server
MSS-LaRC-1.1 (MSS WS)	Infrastructure, security, DDTS, clearcase view server, office tools
MSS-LaRC-4 (MSS server)	Infrastructure, security, DCE time server, GUI support tools, Office, custom compilers, development, essm, HPOV (out-of-the -box), pure coverage, perl5, clearcase client (point to krypton), custom software compilers
CSS-LaRC-1 (CSS server)	Infrastructure, dce (Replicate Directory, Security and Time servers), security, net.h++, DNS slave for LaRC, NIS slave
ACMHW-LaRC-4 (NFS server)	Infrastructure, security, NFS server, DNS master mail server for LaRC, NIS master, license server

Table 6.4-2c. COTS Mapping to Hardware Platforms at EDC

Testbed host platform at EDC	COTS
SPRHW-EDC-1	Infrastructure, clearcase client (point to MSS-CM server), SSI&T and custom software compilers, CaseVision, NCSA HDF, GUI support tools, IDL,IMSL pure coverage, security software, kftp, kerberos client, Legato Networker server autosys remote agent
AITHW-EDC-1 (SSIT WS)	Infrastructure, custom software compilers, development environment, GUI support tools, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF
AITHW-EDC-3 (SSIT DBMS server)	Infrstructure, custom software compilers, development environment, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF Sybase SQL server for PDPS database, Sybase SQL server for autosys DB
PLNHW-EDC-1 (Planning WS)	Infrastructure, security, Autosys, AutoXpert,
PLNHW-EDC-2 (planning & queuing server)	Infrastructure, custom software compilers, development, GUI support tools, clearcase client (point to krypton), sybase SQL server for autosys DB, net.h++#, dce dev tlkt, office, Autosys, AutoXpert, pure coverage, PDPS DB, Autosys DB, NCSA HDF, Netscape commerce server
MSS-EDC-1 (CM server)	Infrastructure, Security, clearcase server, Clearcase VOB server , IQ report writer, license server
MSS-EDC-4 (MSS WS)	Infrastructure, Security, DDTS, clearcase view server, office tools
MSS-EDC-2 (MSS server)	Infrastructure, security, DCE time server, GUI support tools, Office, custom compilers, development, essm, HPOV (out-of-the -box), pure coverage, perl5, clearcase client (point to krypton), custom software compilers
CSS-EDC-1 (CSS server)	Infrastructure, dce (Replicate Directory, Security and Time servers), security, net.h++, DNS slave for EDC, NIS slave
ACMHW-EDC-3 (NFS server)	Infrastructure, security, NFS server, DNS master mail server for EDC, NIS master, license server

Table 6.4-2d. COTS Mapping to Hardware Platforms at NSIDC

Testbed host platform at NSIDC	COTS
SPRHW-NSIDC-1 (Science processor)	Infrastructure, clearcase client (point to MSS-CM server), SSI&T and custom software compilers, CaseVision, NCSA HDF, GUI support tools, IDL,IMSL pure coverage, security software, kftp, kerberos client, Legato Networker server autosys remote agent
SPRHW-NSIDC-2 (science processor file server)	Operating system, Legato Networker client
AITHW-NSIDC-1 (SSIT WS)	Infrastructure, custom software compilers, development environment, GUI support tools, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF
AITHW-NSIDC-2 (dbms server)	Infrstructure, custom software compilers, development environment, Office, SSI&T compilers, SSI&T tools, idl, imsl, autosys, autoxpert, security, kftp, sqr wkbch, kerberos client, clearcase client (point to MSS-CM server), NCSA HDF Sybase SQL server for PDPS database, Sybase SQL server for autosys DB
PLNHW-NSIDC-1 (Planning and queuing server)	Infrastructure, custom software compilers, development, GUI support tools, clearcase client (point to krypton), sybase SQL server for autosys DB, net.h++#, dce dev tlkt, office, Autosys, AutoXpert, pure coverage, PDPS DB, Autosys DB, NCSA HDF, Netscape commerce server
PLNHW-NSIDC-2 (Planning WS)	Infrastructure, security, Autosys, AutoXpert,
MSS-NSIDC-2 (CM server)	Infrastructure, security, clearcase server, Clearcase VOB server, IQ report writer, license server
MSS-NSIDC-1 (MSS server)	Infrastructure, security, DCE time server, GUI support tools, Office, custom compilers, development, essm, HPOV (out-of-the -box), pure coverage, perl5, clearcase client (point to krypton), custom software compilers
MSS-NSIDC-3 (MSS WS)	Infrastructure, security, office tools, DDTS, clearcase view server
CSS-NSIDC-1 (CSS server)	Infrastructure, security, dce (Replicate Directory, Security and Time servers), net.h++, DNS slave for NSIDC, NIS slave
ACMHW-NSIDC-1 (NFS server)	Infrastructure, security, NFS server, DNS master mail server for NSIDC, NIS master, license server

6.5 Hardware Summary

Table 6.5 summarizes the Testbed hardware equipment at each of the four sites.

Table 6.5-1. Testbed Hardware Summary

Hardware	GSFC	LARC	NSIDC	EDC
Sun WS and servers	6	6	6	6
Sun RAID and disk array	3	3	2	3
HP WS and servers	2	2	2	2
HP RAID	1	1	1	1
SGI servers	2	3	3	2
SGI Raid	5	5	3	From RAIDTower 1 (IMF archive and science processing)
8 mm stacker	2	1	1	1
4 mm	1	1	1	1
X Terminal	2	5	1	1
Printer	2	2	1	2

7. Testbed Operations Concept

Operations of the Testbed will be narrower in scope than those planned for Release A because of the limited focus of the Testbed and the lack of a full suite of tools. The following sections address critical operations activities.

7.1 Roles and Responsibilities

The Testbed has multiple stakeholders. Table 7.1-1, modeled after the Ir-1 experience, summarizes key roles and responsibilities of those stakeholders. Table 7.1-2 shows organizational roles and responsibilities for key Testbed activities in more detail.

Table 7.1-2 uses DID 607 ECS M&O Position Descriptions, operator position names. The functions identified in Table 7.1-2 may require part time, full time, or multiple staff members to accomplish. The Table frequently refers to site, ESDIS and ECS policies and procedures. The initial set of ECS procedures will be part of the DID 611, Mission Operations Procedures, that will be published in Apr-97. Responsibility for the evolution and maintenance of these, as well as any site-unique, procedures will then be allocated to the DAACs' staff based on the roles and responsibilities in the Table.

Table 7.1-1. Organizations' Summary Roles and Responsibilities

Organization Identifier	Organization	Summary Roles and Responsibilities
ECS/ILS	ECS Integrated Logistics Support Staff	Provide system ILS and property management functions. Support site maintenance activities.
ECS/M&O	ECS M&O Office Management	Provide ECS/M&O system level Testbed Configuration Control Board function for Testbed
ECS/SCDO	ECS Science and Communications Development Organization	Support the maintenance of Testbed SW IAW M&O and SCDO agreements.
ECS/SEO	ECS M&O Staff in the Sustaining Engineering Organization	Maintain and manage ECS System (i.e., not DAAC-unique) Testbed SW. Coordinate Trouble Ticket (TT) analysis and configuration changes with DAACs. Provide training, both operational and COTS.
ECS/SMO	ECS System Management Office	Provide the lead for external I/F tests.
EDAAC/ECS	ECS M&O Staff at the EDC DAAC	Operate and maintain all components of the Testbed including SSI&T and I/F test operations. Maintain ESDTs after initial delivery. Support system level sustaining engineering.

Table 7.1-1. Organizations' Summary Roles and Responsibilities (cont.)

Organization Identifier	Organization	Summary Roles and Responsibilities
ESDIS	ESDIS Project Office	Review and provide feedback on all Testbed maintenance actions. Provide project office coordination for SSI&T and external I/F tests.
GDAAC/ECS	ECS M&O Staff at the GSFC DAAC	Operate and maintain all components of the Testbed including SSI&T and I/F test operations. Maintain ESDTs after initial delivery. Support system level sustaining engineering.
ITs	Instrument Teams	Provide SSI&T algorithms, test procedures & test data. Perform SSI&T in collaboration with the DAAC(s), ECS/SDE and other organizations.
LDAAC/CSC	CSC M&O Staff at the LaRC DAAC	Provide the lead in site SSI&T activities. Perform all functions not covered by the LDAAC/ECS staff including I/F test operations, resource planning, database administration, primary SSI&T support to Its including configuration management, support LDAAC/ECS system engineering, and archive management.
LDAAC/ECS	ECS M&O Staff at the LaRC DAAC	Provide system management, fault analysis, SW maintenance, system engineering, software engineering, system test, configuration management of ECS configuration items, property management, HW maintenance coordination, and system administration for the Testbed. Support SSI&T and I/F tests. Support system level sustaining engineering.
NDAAC/ECS	ECS M&O Staff at the NSIDC DAAC	Operate and maintain all components of the Testbed including SSI&T and I/F test operations. Maintain ESDTs after initial delivery. Support system level sustaining engineering.

Table 7.1-2. Testbed Roles and Responsibilities

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Configuration Management Configuration Control Board	• DAAC CCB reviews and dispositions site unique HW, SW, database, etc., change requests • DAAC CCB reviews and impacts system level change requests	• DAAC CCB reviews and dispositions site unique HW, SW, database, etc., change requests • DAAC CCB reviews and impacts system level change requests	• DAAC CCB reviews and dispositions site unique HW, SW, database, etc., change requests • DAAC CCB reviews and impacts system level change requests	• DAAC CCB reviews and dispositions site unique HW, SW, database, etc., change requests • DAAC CCB reviews and impacts system level change requests	• Constitutes ECS/M&O System Level Testbed CCB to review and disposition system level change requests • ECS/M&O Testbed CCB reviews and impacts site unique changes
Configuration Management HW Configuration Management (on site)	• EDAAC/ECS Maintenance Coordinator (or Vendor) implements changes IAW DAAC CCB approvals • EDAAC/ECS Maintenance Coordinator maintains site HW baseline configuration doc.	• GDAAC/ECS Maintenance Coordinator (or Vendor) implements changes IAW DAAC CCB approvals • GDAAC/ECS Maintenance Coordinator maintains site HW baseline configuration doc.	• LDAAC/ECS Maintenance Coordinator (or Vendor) implements changes IAW DAAC CCB approvals • LDAAC/ECS Maintenance Coordinator maintains site HW baseline configuration doc.	• NDAAC/ECS Maintenance Coordinator (or Vendor) implements changes IAW DAAC CCB approvals • NDAAC/ECS Maintenance Coordinator maintains site HW baseline configuration doc.	• ECS/ILS maintains system level HW configuration doc.

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Configuration Management SW Configuration Management	• EDAAC/ECS System Administrator installs changes in accordance with site and ECS policies and procedures • EDAAC/ECS CM maintains site SW baseline configuration description	• GDAAC/ECS System Administrator installs changes in accordance with site and ECS policies and procedures • GDAAC/ECS CM maintains site SW baseline configuration description	• LDAAC/ECS System Administrator installs changes in accordance with site and ECS policies and procedures • LDAAC/ECS CM maintains site SW baseline configuration description	• NDAAC/ECS System Administrator installs changes in accordance with site and ECS policies and procedures NDAAC/ECS CM maintains site SW baseline configuration description	• ECS/SEO maintains core system master copy • ECS/SEO maintains a reference copy of site unique changes as backup • ECS/SEO distributes SW to site CM
Configuration Management Science Algorithms	• EDAAC/ECS CM Administrator captures and manages science SW using Testbed tools in accordance with site policies and procedures	• GDAAC/ECS CM Administrator captures and manages science SW using Testbed tools in accordance with site policies and procedures	• LDAAC/CSC CM Administrator captures and manages science SW using Testbed tools in accordance with site policies and procedures	• NDAAC/ECS CM Administrator captures and manages science SW using Testbed tools in accordance with site policies and procedures	• N/A

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Hardware Maintenance COTS HW Vendor Maintenance Liaison	• EDAAC/ECS Maintenance Coordinator contacts vendors for maintenance actions • EDAAC/ECS Maintenance Coordinator coordinates with ECS/ILS on maintenance actions • EDAAC/ECS Maintenance Coordinator maintains site property database	• GDAAC/ECS Maintenance Coordinator contacts vendors for maintenance actions • GDAAC/ECS Maintenance Coordinator coordinates with ECS/ILS on maintenance actions • GDAAC/ECS Maintenance Coordinator maintains site property database	• LDAAC/ECS System Administrator contacts vendors for maintenance actions • LDAAC/ECS System Administrator coordinates with ECS/ILS on maintenance actions • LDAAC/ECS System Administrator maintains site property database	• NDAAC/ECS Maintenance Coordinator contacts vendors for maintenance actions • NDAAC/ECS Maintenance Coordinator coordinates with ECS/ILS on maintenance actions • NDAAC/ECS Maintenance Coordinator maintains site property database	• ECS/ILS coordinates maintenance coverage/ contracts with vendors, monitors vendor performance, collects and maintains maintenance data, produces maintenance reports
I/F Testing External I/F Operations	• Formal interface testing will not require DAAC support.	• Formal interface testing will not require DAAC support.	• Formal interface testing will not require DAAC support.	• Formal interface testing will not require DAAC support.	• N/A
Property Management Shipping and Receiving	• EDAAC/ECS property Manager supports ECS/ILS personnel as needed and appropriate	• GDAAC/ECS Property Manager supports ECS/ILS personnel as needed and appropriate	• LDAAC/ECS supports ECS/ILS personnel as needed and appropriate	• NDAAC/ECS supports ECS/ILS personnel as needed and appropriate	• Performed by ECS/ILS personnel

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Property Management Expendables Management COTS Management Shipping and Receiving	• EDAAC/ECS Property Manager performs on-site functions	• GDAAC/ECS Property Manager performs on-site functions	• Performed by ECS/ILS personnel • LDAAC/ECS System Administrator supports ECS/ILS personnel as needed and appropriate	• NDAAC/ECS Property Manager performs on-site functions	• System level property management performed by ECS/ILS personnel
Resource Planning HW/SW Utilization Planning	• EDAAC/ECS Resource Planner reviews resource requests and develops and distributes utilization plan	• GDAAC/ECS Resource Planner reviews resource requests and develops and distributes utilization plan	• LDAAC/CSC Resource Planner reviews resource requests and develops and distributes utilization plan	• NDAAC/ECS Resource Planner reviews resource requests and develops and distributes utilization plan	• N/A

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Software Maintenance Database Administration	• EDAAC/ECS Database Administrator designs and implements changes to site-unique databases and/or database contents using change control process • EDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• GDAAC/ECS Database Administrator designs and implements changes to site-unique databases and/or database contents using change control process • GDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• LDAAC/CSC Database Administrator designs and implements changes to site-unique databases and/or database contents using change control process • LDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• NDAAC/ECS Database Administrator designs and implements changes to site-unique databases and/or database contents using change control process • NDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• ECS/SEO Database Administrator designs and implements changes to system databases in accordance with ECS and ESDIS

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Software Maintenance Custom & COTS SW Maintenance	• EDAAC/ECS Software Engineer designs and implements changes to software using change control process • EDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• GDAAC/ECS Software Engineer designs and implements changes to software using change control process • GDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• LDAAC/ECS Software Engineer designs and implements changes to software using change control process • LDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• NDAAC/ECS Software Engineer designs and implements changes to software using change control process • NDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures	• ECS/SEO Software Engineer designs and implements changes to ECS software in accordance with ECS and ESDIS priorities and processes

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
Software Maintenance Site Unique Changes	• EDAAC/ECS or other DAAC personnel design and implement site unique changes to ECS SW • EDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures • EDAAC/ECS SW Maintenance Engineer and EDAAC/ECS System Test Engineer participate site activities	• GDAAC/ECS or other DAAC personnel design and implement site unique changes to ECS SW • GDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures • GDAAC/ECS SW Maintenance Engineer and EDAAC/ECS System Test Engineer participate site activities	• LDAAC/ECS or other DAAC personnel design and implement site unique changes to ECS SW • LDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures • LDAAC/ECS SW Maintenance Engineer and EDAAC/ECS System Test Engineer participate site activities	• NDAAC/ECS or other DAAC personnel design and implement site unique changes to ECS SW • NDAAC/ECS System Administrator installs changes into site baseline in accordance with site, ESDIS and ECS policies and procedures • NDAAC/ECS SW Maintenance Engineer and NDAAC/ECS System Test Engineer participate site activities	• Incorporate site-unique changes into system baseline as appropriate

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
SSI&T Production Planning	• EDAAC/ECS Production Planner manages site job scheduling activities • EDAAC/ECS staff supports Instrument Teams, DAAC, and ECS/SDE	• GDAAC/EDC Production Planner manages site job scheduling activities • GDAAC/ECS staff supports Instrument Team, DAAC, and ECS/SDE	• LDAAC/CSC Production Planner manages site job scheduling activities • LDAAC/ECS staff supports Instrument Teams, DAAC, and ECS/SDE	• NDAAC/ECS Production Planner manages site job scheduling activities • NDAAC/ECS staff supports Instrument Team, DAAC, and ECS/SDE	• See Section 2.4 for SDE
SSI&T Production Monitoring	• EDAAC/ECS Production Monitor supports SSI&T by monitoring and supporting PGE testing	• GDAAC/ECS Production Monitor supports SSI&T by monitoring and supporting PGE testing	• LDAAC/CSC Production Monitor supports SSI&T by monitoring and supporting PGE testing • LDAAC/ECS assist in monitoring and supporting PGE testing	• NDAAC/ECS Production Monitor supports SSI&T by monitoring and supporting PGE testing	• N/A
SSI&T Resource Management	• EDAAC/ECS Resource Manager monitors performance of Testbed resources, and develops and distributes reports and data	• GDAAC/ECS Resource Manager monitors performance of Testbed resources, and develops and distributes reports and data	• LDAAC/CSC Resource Manager monitors performance of Testbed resources, and develops and distributes reports and data	• NDAAC/ECS Resource Manager monitors performance of Testbed resources, and develops and distributes reports and data	• N/A

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
SSI&T ESDT Generation and Maintenance	• EDAAC/ECS Science Data Specialist maintains after delivery	• GDAAC/ECS Science Data Specialist maintains after delivery	• LDAAC/CSC Science Data Specialist maintains after delivery	• NDAAC/ECS Science Data Specialist maintains after delivery	• See Section 2.4 for SDE
SSI&T Database Administration	• See Software Maintenance - Database Administration	• See Software Maintenance - Database Administration	• See Software Maintenance - Database Administration	• See Software Maintenance - Database Administration	• See Software Maintenance - Database Administration
System Administration Computer Backups	• EDAAC/ECS System Administrator schedules and/or performs system backups	• GDAAC/ECS System Administrator schedules and/or performs system backups	• LDAAC/ECS System Administrator schedules and/or performs system backups	• NDAAC/ECS System Administrator schedules and/or performs system backups	• N/A
System Administration ECS Custom or COTS SW Installation and Configuration	• EDAAC/ECS System Administrator installs and configures ECS SW	• GDAAC/ECS System Administrator installs and configures ECS SW	• LDAAC/ECS System Administrator installs and configures ECS SW	• NDAAC/ECS System Administrator installs and configures ECS SW	• N/A
System Administration Security Management	• EDAAC/ECS System Administrator monitors security logs and data, reports security issues, etc.	• GDAAC/ECS System Administrator monitors security logs and data, reports security issues, etc.	• LDAAC/ECS System Administrator monitors security logs and data, reports security issues, etc.	• NDAAC/ECS System Administrator monitors security logs and data, reports security issues, etc.	• N/A
System Administration Accountability Management	• EDAAC/ECS System Administrator maintains user accounts	• GDAAC/ECS System Administrator maintains user accounts	• LDAAC/ECS System Administrator maintains user accounts	• NDAAC/ECS System Administrator maintains user accounts	• N/A

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
System Engineering Data Collection, Analysis and Trending	• EDAAC/ECS System Engineer collects, reviews data, and develops configuration changes in accordance with site, ESDIS and ECS policies and procedures • EDAAC/ECS System Administrator supports by collecting and assembling supporting data	• GDAAC/ECS System Engineer collects, reviews data, and develops configuration changes in accordance with site, ESDIS and ECS policies and procedures • GDAAC/ECS System Administrator supports by collecting and assembling supporting data	• LDAAC/ECS System Engineer collects, reviews data, and develops configuration changes in accordance with site, ESDIS and ECS policies and procedures • LDAAC/CSC System Engineer supports LDAAC/ECS System Engineer • LDAAC/ECS System Administrator supports by collecting and assembling supporting data	• NDAAC/ECS System Engineer collects, reviews data, and develops configuration changes in accordance with site, ESDIS and ECS policies and procedures • NDAAC/ECS System Administrator supports by collecting and assembling supporting data	• ECS/SEO System Engineer reviews data collected at DAACs and develops configuration changes in accordance with ESDIS and ECS policies and procedures
System Engineering Trouble Ticket Investigations	• EDAAC/ECS System Engineer collects data, categorizes TT, and presents TT to TT Telecon	• GDAAC/ECS System Engineer collects data, categorizes TT, and presents TT to TT Telecon	• LDAAC/ECS System Engineer collects data, categorizes TT, and presents TT to TT Telecon	• NDAAC/ECS System Engineer collects data, categorizes TT, and presents TT to TT Telecon	• ECS/SEO reviews TT and assigns Responsible Engineer for further investigations

Table 7.1-2. Testbed Roles and Responsibilities (cont.)

Function	EDC DAAC	GSFC DAAC	LaRC DAAC	NSIDC DAAC	System Level Organizations ECS/ILS ECS/M&O ECS/SEO ECS/SMO
System Engineering System Management	• EDAAC/ECS System Engineer reviews all ECS configuration changes. • Makes recommendations on those changes to DAAC CCB. • Instructs and supervises EDAAC/ECS System administrators on implementation of changes after CCB approval	• GDAAC/ECS System Engineer reviews all ECS configuration changes. • Makes recommendations on those changes to DAAC CCB. • Instructs and supervises GDAAC/ECS System administrators on implementation of changes after CCB approval	• LDAAC/ECS System Engineer reviews all ECS configuration changes. • Makes recommendations on those changes to DAAC CCB. • Instructs and supervises LDAAC/ECS System administrators on implementation of changes after CCB approval	• NDAAC/ECS System Engineer reviews all ECS configuration changes. • Makes recommendations on those changes to DAAC CCB. • Instructs and supervises NDAAC/ECS System administrators on implementation of changes after CCB approval	• N/A

7.2 Staffing

Tables 7.2-1 through 7.2-5 show ECS staffing by site for Testbed activities only, at the EDC DAAC, GSFC DAAC, LaRC DAAC, NSIDC DAAC, and the SEO. The staffing shown here will be supplemented by additional B.0 staffing in November 1997, The combined staffing will support both B.0 testing and readiness activities as well as Testbed operations. Testbed staffing levels are subject to further analysis and negotiations with ESDIS and DAAC Customers. The basis of estimate for each Table is as follows:

- EDC DAAC staffing: Based on recommendations from the DAAC.
- GSFC DAAC staffing: Based on recommendations from the DAAC.
- LaRC DAAC staffing: The ECS Contract's scope at LaRC has been limited by the Government. The two individuals shown in Table 7.2-3 provide system administration and HW maintenance/ILS in support of the testbed through the end of Testbed operations, nominally 31-Mar-98. No additional long term staffing beyond that staffing covered by the

Government's direction is required. ECS short term staffing needs will be met by sending staff members to LaRC on travel status. Other LaRC contractor's staffing is at the discretion of the Government and outside the scope of the ECS contract so is not estimated in this paper.

- NSIDC DAAC staffing: Based on recommendations from the DAAC.
- SEO staffing: Staffing for support to Release B does not start until Nov-97. This staffing is intended to support Testbed operations until that date.

Table 7.2-1. EDC DAAC Staffing

EDC Testbed Function	Testbed HW Install Mar-97	Begin Testbed Testing May-97	Begin Testbed Jun-97	Release B.0 CSR Nov-97	End of Contract Nov-02
8.1.4 a. DAAC ECS Contr. Mgr. 8.1.4 b. DAAC Ops Readiness & Perf. Assur. 8.1.4 c. DAAC Assistance Engr & Liaisons					
8.1.4 d DAAC Administrative Assistant 8.4.4 b. DAAC System		1.00	1.00		
8.4.4 c.1 DAAC SW Maintenance Engineer 8.4.4 c.2 DAAC SW Maintenance Engineer 8.4.4 d. DAAC System Test			1.00		
8.4.4 e DAAC Database Administrator 8.4.4 f. DAAC Resource Planner 8.4.4 g. DAAC CM Administrator		1.00	1.00 0.50 1.00		
8.4.4 I. DAAC ILS Administrator 8.7.4.2 a. DAAC Maintenance Coordinator 8.7.4.2 b. DAAC Science SW I&T Support Engr.	0.50 0.50	0.50 0.50	0.50 0.50		
8.7.4.2 c. DAAC Science Coordinator 8.7.4 .2 d. DAAC User Services Rep. 8.7.4 .2 e. DAAC Science Data Specialist		1.00	2.00		
8.7.4 .2 f. DAAC Operations Supervisor 8.7.4 .2 g. DAAC Production Planner 8.7.4 .2 h. DAAC Production Monitor					
8.7.4 .2 i. DAAC Resource Manager 8.7.4 .2 j. DAAC Archive Manager 8.7.4 .2 k. DAAC Ingest/Distribution Tech.			0.50		
8.7.4 .2 l. DAAC Data Migration 8.7.4 .2 m. DAAC Computer Operator 8.7.4 .2 n. DAAC System Administrator	1.00	1.00	1.00		
TOTAL	2.00	5.00	9.00		

Table 7.2-2. GSFC DAAC Staffing[1]

GSFC Testbed	Testbed Test Support	Begin Testbed Ops	Release B.0 CSR	End of Contract
Function	**Feb-97**	**May-97**	**Nov-97**	**Nov-02**
8.1.1 a. DAAC ECS Contr. Mgr.	1.00	1.00		
8.1.1 b. DAAC Ops Readiness & Perf. Assur.	1.00	1.00		
8.1.1 c. DAAC Assistance Engr & Liaisons				
8.1.1 d. DAAC Administrative Assistant	1.00	1.00		
8.1.1 b. DAAC System	2.00	2.00		
8.4.1 c. DAAC SW Maintenance	2.00	3.00		
8.4.1 d. DAAC CM System Test		1.00		
8.4.1 e. DAAC Database	2.00	2.00		
8.4.1 f. DAAC Resource	1.00	1.00		
8.4.1 g. DAAC CM	2.00	2.00		
8.4.1 i. DAAC ILS		0.50		
8.7.1.2 a DAAC Maintenance	1.00	0.50		
8.7.1.2 b DAAC Science SW I&T Support		1.00		
8.7.1.2 c DAAC Science				
8.7.1.2 d. DAAC User Services				
8.7.1.2 e. DAAC Science Data				
8.7.1.2 f. DAAC Operations		1.00		
8.7.1.2 g. DAAC Production Planner	1.00	1.00		
8.7.1.2 h. DAAC Production Monitor	1.00	1.00		
8.7.1.2 i. DAAC Resource	1.00	2.00		
8.7.1.2 j. DAAC Archive	1.00	1.00		
8.7.1.2 k. DAAC Ingest/Distribution Tech.				
8.7.1.2. l DAAC VO Data				
8.7.1.2 m DAAC Computer		2.00		
8.7.1.2. n DAAC System	2.00	3.00		
TOTAL	19.00	28.00		

[1] Because the GSFC DAAC was a Release A DAAC, no additional staffing is required.

Table 7.2-3. LaRC DAAC Staffing

LaRC Testbed Function	Oct-96	Apr-97	End of Contract Nov-02
8.1.7 a. DAAC ECS Contr. Mgr 8.1.7 b DAAC Ops Readiness & Perf. Assurance 8.1.7 c DAAC Assistance Engineer & Liaisons 8.1.7 d. DAAC Administrative Assistant 8.4.7b. DAAC System Engineer 8.4.7 c. DAAC SW Maintenance Engineer 8.4.7 d. DAAC System Test Engineer 8.4.7 e. DAAC Database administrator 8.4.7 f DAAC Resource Planner 8.7.4 g. DAAC CM Administrator 8.7.4 h. DAAC ILS Administrator	0.50		
8.7.7.2 a. DAAC Maintenance Coordinator 8.7.7.2 b. DAAC Science SW I&T Support Engineer 8.7.7.2 c. DAAC Science Coordinator 8.7.7.2 d. DAAC User Services Representative 8.7.7.2 e. DAC Science Data Specialist 8.7.7.2 f. DAAC Operations Supervisor 8.7.7.2 g. DAAC Production Planner 8.7.7.2 h. DAAC Production Monitor 8.7.7.2 i. DAAC Resource Manager 8.7.7.2 j. DAAC Archive Manager 8.7.7.2 k. DAAC Ingest/Distribution Tech. 8.7.7.2 l. DAAC VO Data Migration 8.7.7.2 m. DAAC Computer Operator 8.7.7.2 n. DAAC System Administrator	0.50 1.00		
TOTAL	2.00		

Table 7.2-4. NSIDC DAAC Staffing

NSIDC Testbed	Testbed HW install	Begin Testbed Ops	End of Contract
Function	**May-97**	**Jun-97**	**Nov-02**
8.1.6 a. DAAC ECS Contr. Manager 8.1.6 b. DAAC Ops Readiness & Performance Assurance 8.1.6 c. DAAC Assistance Engineer & Liaisons 8.1.6 d. DAAC Administrative Assistant			
8.4.6 b. DAAC System Engineer 8.4.6 c. DAAC SW Maintenance Engineer 8.4.6 d. DAAC System Test Engineer 8.4.6 e. DAAC Database Administrator 8.4.6 f. DAAC Resource Planner 8.4.6 g DAAC CM Administrator 8.4.6 I DAAC ILS Administrator			
8.7.6.2 a. DAAC Maintenance Coordinator 8.7.6.2 b. DAAC Science SW I&T Support Engineer 8.7.6.2 c. DAAC Science Coordinator 8.7.6.2 d. DAAC User Services Representative 8.7.6.2 e. DAAC Science Data Specialist 8.7.6.2 f. DAAC Operations Supervisor 8.7.6.2 g. DAAC Production Planner 8.7.6.2 h. DAAC Production Monitor 8.7.6.2 I. DAAC Resource Manager 8.7.6.2 j. DAAC Archive Manager 8.7.6.2 k. DAAC Ingest/Distribution Tech. 8.7.6.2 l. DAAC VO Data Migration 8.7.6.2 m. DAAC Computer Operator 8.7.6.2 n. DAAC System Administrator	 1.00	 1.00 1.00	
TOTAL	1.00	2.00	

Table 7.2-5. SEO Staffing

SEO Testbed Function	Feb -97	Apr-97	May -97	Nov -97	End of Contract Nov-02
8.1.1 a. ECS Managers & SEO Aas	8.00	8.00	8.00		
8.1.1 b. SEO Ops Readiness & Performance Assurance	1.00	1.00	1.00		
8.2.1 a. ILS (Admin, Logistics, Install, Prop)	5.00	5.00	5.00		
8.2.1 b Maintenance Coordinator	6.00	5.00	5.00		
8.3.1 a. SEO ECS Operations Trainer	5.00	5.00	5.00		
8.4.1.2 a. SEO System Engineer	4.00	4.00	4.00		
8.4.1.2 b. SEO SW Maintenance Engineer	2.00	10.00	10.00		
8.4.1.2 c. SEO System Test Engineer	2.00	2.00	2.00		
8.4.1.2 d. SEO CM Administrator	5.00	5.00	5.00		
8.4.1.2 d. SEO System Administrator					
8.4.1.2 e. SEO Science Coordinator	1.00	1.00	1.00		
8.4.1.2 f. SEO Librarian	1.00	1.00	1.00		
A: 150K SLOC B:302K SLOC					
LaRC Impact: 8.4.1.2 a. SEO System Engineer 8.4.1.2 b. SEO System Administrator 8.4.1.2 c. SEO CM Administrator 8.4.1.2 c SEO System Test Engineer 8.4.1.2 e. SEO SW Maintenance Engineer		 2.00 1.00 2.00	 2.00		
TOTAL	40.00	54.00	49.00		

8. Software Maintenance

8.1 Maintenance Concept

Maintenance of the ECS COTS and custom software will be controlled by the ECS M&O organization for the Testbed. The maintenance process is being developed at the present time, but the information in Sections 8.2 through 8.4 below was initially extracted from the following references currently under development by M &O:

Reference 1. The "ECS Project Training Material" , Volume 18, entitled "Software Maintenance" , Draft CDRL/TD # 625-DR-018-001. The draft version contains material for a fully released (RRR'ed) software maintenance system, and it was completed 31 January, 1997. This material is being updated to contain training material for the Testbed. This Testbed training material is expected to be available before May, 1997. In order to obtain more details on the Testbed software maintenance process, the reader is referred to this material at that time.

Reference 2. ECS' response to the "Management of Software Sustaining Engineering" Technical Direction #31. The draft January, 1997 charts are expected to be completed in February, 1997 The written documentation is expected to be completed by the end of March, 1997, consistent with the Technical Direction requirements. The reader should consult this documentation at that time in order to obtain details of the software maintenance process for enhancing a fully released ECS software system during the maintenance and operations timeframe of the system.

The information in the above references was modified, as appropriate for the maintenance of unreleased/Testbed software. A summary of the maintenance concepts for the Testbed are described in Sections 8.2 through 8.4 below.

8.2 Overview of Testbed Software Maintenance

In general, software maintenance entails changes to software or related activities that are required by threatened or actual deficiencies in software performance. This is distinguished from changes that result from "enhancements" (i.e., changes as a result of new or modified requirements).

For the Testbed, software maintenance shall consist of corrective maintenance; (that is, identification and correction of high priority Testbed software failures, performance failures, and implementation failures). Except in cases where a problem is considered Category 1 (see below) or of sufficient priority as determined by a Testbed CCB, Testbed maintenance will not consist of "adaptive maintenance", (i.e., software adaptation to changes in processing requirements, such as an upgraded computer system); "perfective maintenance", (i.e., improving performance, processing efficiency, or maintainability); nor "preventative maintenance", (i.e., reducing impacts of anticipated problems).

Figure 8.2-1 illustrates the anticipated problem initiation process and the process of controlling the maintenance of the Testbed.

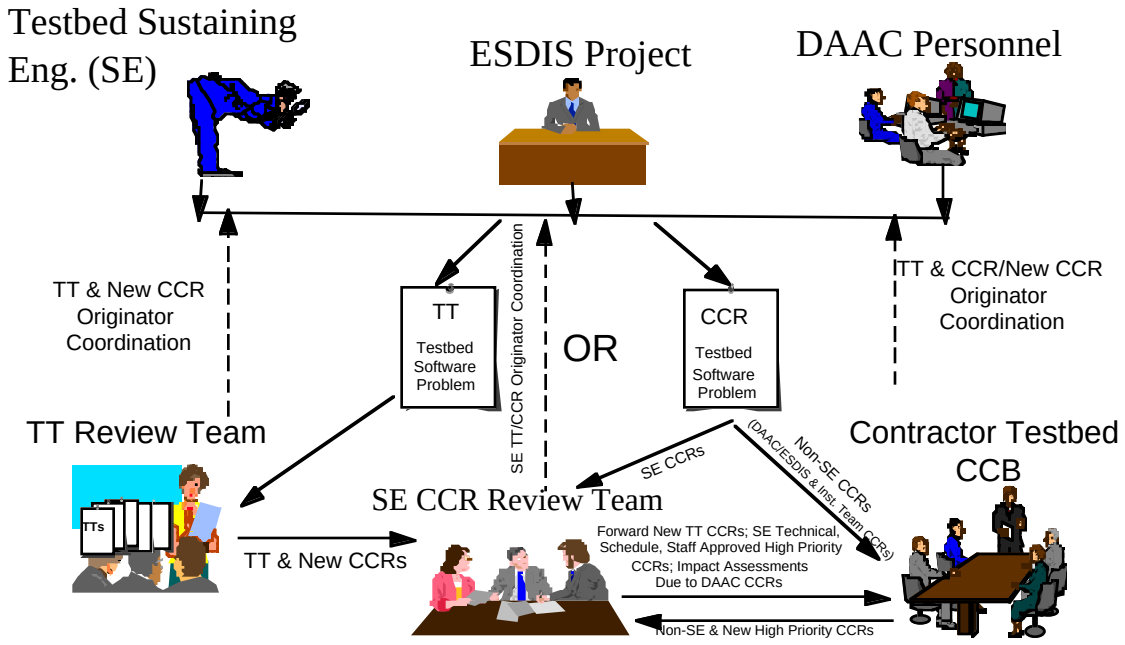


Figure 8.2-1. Testbed Maintenance (Problem Initiation and Control)

The software maintenance categories, identified below, are defined in "Performance Assurance Requirements" NASA 420-05-03 and by the ECS project. The Testbed software maintenance categories are expected to be consistent with these categories. Testbed maintenance will consist of placing priority on approved Category 1 problems. A level-of-effort corrective maintenance effort will be performed on these approved Category 1 problems, as well as on any approved Category 2-4 problems.

Category 1: System/service cannot perform critical function or imposes major safety hazard.

Category 2: System/service substantially impaired.

Category 3: System/service slightly impaired.

Category 4: Nuisance problem.

Category 5: Closed problem.

Figure 8.2-2 illustrates the ECS sustaining engineering functions as stated in the ECS SOW 3.8.3.2.1 and 3.8.3.2.3. For unreleased software, a subset of the functions are expected to be performed by the ECS Testbed sustaining engineering function on a level-of-effort basis. The functions that will not be performed for unreleased software have been X'ed out in Figure 8.2-2. Provided all the required SSI&T hardware is available, maintenance of the Testbed will begin at the Testbed turnovers and is projected to continue through December 1997, or until Release B.0 is available.

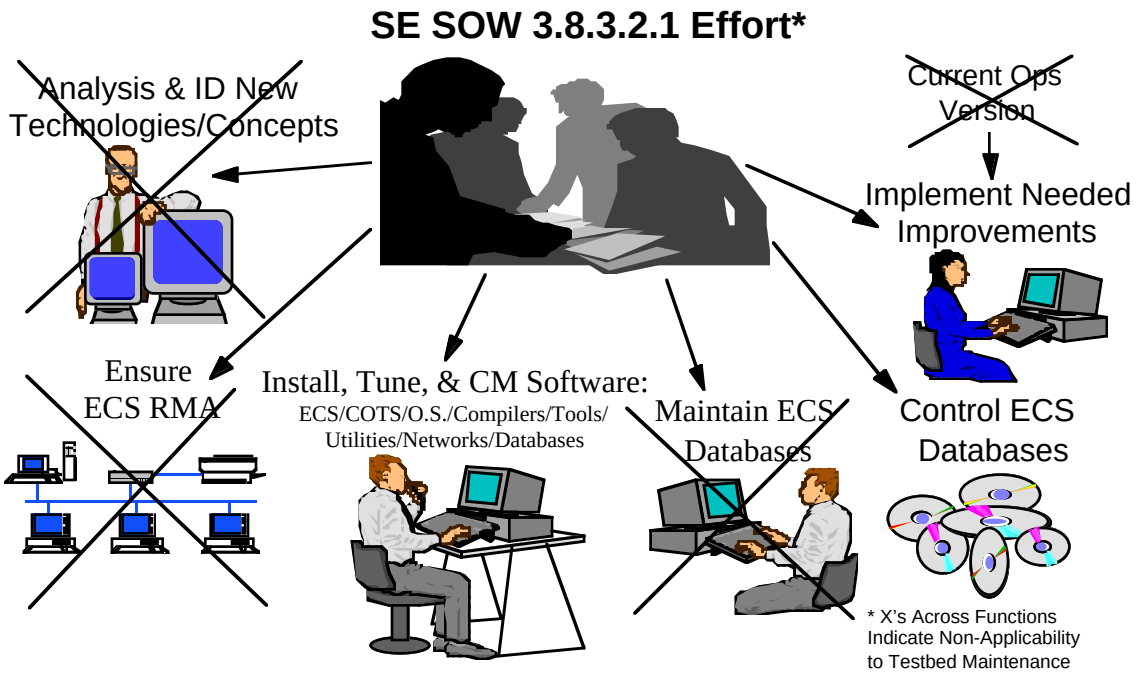


Figure 8.2-2. Testbed Sustaining Engineering Functions (Non-X'ed Functions)

8.3 Maintenance of Testbed COTS Software

Maintenance of the Testbed COTS software for ECS is expected to involve:

- Maintaining the Testbed software use licenses.
- Obtaining telephone assistance in resolving the Testbed COTS software problems.
- Obtaining vendor software patches, if available.
- Obtaining vendor software upgrades, if available.

Contracting COTS software vendor support for the Testbed will be an ECS procurement office function, and the COTS contracts, property, and software license database is maintained by the ECS Integrated Logistic Support (ILS) office. The ECS license types are negotiated for the different Testbed COTS products, and the restrictions are expected to be imposed and tracked during maintenance of the Testbed by the ILS office. Changes to the COTS software are expected to be requested by writing a trouble ticket (TT).

DAAC support to maintaining the Testbed consists of:

- Preparing a trouble ticket.
- Analysis of a problem in order to confirm existence of a COTS software problem; (such as using the ECS Event Log Browser; review of messages against COTS software manuals; review of Testbed logs; reviewing a vendor Web site solution database).
- Reloading the COTS software.
- Obtaining vendor technical support.
- Exercising/downloading vendor software diagnostics.

It is expected that only high priority COTS software problems will be approved by the ECS Testbed CCB. Prior to the loading of COTS software upgrades on the Testbed, a Configuration Change Request (CCR), is written and approved, as illustrated in Figure 8.2-1. Once approved, and after sustaining engineering regression tests the COTS product version with the ECS Testbed system, the COTS software is available to a pre-defined Testbed DAAC Responsible Engineer who will coordinate the installation for the DAAC.

Both Clearcase and XRP-II Baseline Manager tools are expected to be used during Testbed maintenance to control software installation. The reader is referred to the "Mission Operation Procedures", CDRL/TD 611-XX-002-001 for the installation steps and procedures. This documentation is expected to be available at the time of the start of the actual Testbed SSI&T. During the Testbed SSI&T, this documentation will continue to be refined.

8.4 Maintenance of Testbed Custom Software

After the Testbed custom master library has been installed at the Testbed DAACs, sustaining engineering may need to modify the ECS Testbed custom software configuration. As is the case with COTS software problems, a systematic process of troubleshooting Testbed custom software is expected to be performed:

- Initiation of DAAC troubleshooting is performed by a pre-defined DAAC Responsible Engineer who writes a trouble ticket (TT), and assigns a DAAC problem investigator.
- The DAAC problem investigator investigates the problem to determine if the problem has an immediate work-around. If so, the work-around is recorded on the trouble ticket, and the priority of the problem is decreased.

- A Testbed Trouble Ticket Review team reviews the trouble tickets and assigns a priority or recommends a modification to a previously assigned priority, as appropriate. The Testbed Trouble Ticket Review team will coordinate with the TT originator as appropriate to clarify the problems reported in the TT. This team will initiate a CCR for the problem, if a solution is readily known. The TT/draft CCR is forwarded to a Testbed CCR Review Team, who further analyzes the problem in more detail, and/or forwards the new TT CCR with a priority recommendation to a contractor Testbed CCB.

The result of the Testbed CCR Review Team and contractor Testbed CCB process may consist of:

- Recommendations to the Testbed DAACs to modify their Testbed procedures.
- For high priority problems, tracking the TT to obtain additional data.
- Closing the TT into an existing Testbed TT or CCR that documents the same problem but which has not been installed on the Testbed.
- Initiation of a Testbed software maintenance CCR for high priority problems, where the CCR describes the problem, solution, implementation schedule and staffing needs. After approval of the CCR by the Testbed CCR Review Team and by the contractor Testbed CCB, (as illustrated in Figure 8.2-1), the Testbed sustaining engineering implementation team works off the problem described in the maintenance CCR on a level-of-effort basis.

"Enhancement" trouble tickets and CCRs (i.e., new or modified ECS requirements) are also forwarded to a Testbed CCR Review Team, as illustrated in Figure 8.2-1. Although an "enhancement" process for ECS Testbed software is conceptually similar to the above maintenance process, an "enhancement" process for the Testbed is not discussed in this section.

Each approved ECS software maintenance CCR is assigned to a pre-scheduled Testbed system build. This process allows for the consolidation of changes to a Configuration Item (CI); facilitates management by allowing effective setting of maintenance priorities; and provides a positive control of the Testbed baseline. The Version Description Document (VDD) identifies the CCRs for the build, the operational /user features, the build schedule, the CIs, the ECS documentation, test summary results, and the sustaining engineering test team recommendations.

No DAAC-unique extensions are expected during Testbed maintenance.

For an approved Testbed software maintenance CCR, the ECS Testbed sustaining engineering uses a controlled library (Clearcase) to obtain the version of the source code/files. They implement the change and perform unit testing. The ECS Testbed sustaining engineering test team performs tests on the features to insure the CCR has been properly implemented and regression tests the Testbed to revalidate proper operation. "Testing" may consist of inspection, analysis, or demonstration. Concise test plans are prepared for the build.

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9. Training

9.1 Training

The training program for the Testbed consists of a selected subset of the modules originally prepared for Release A and modified in scope and requirements to reflect the configuration and functionality of the Testbed. Table 9.1-1 lists the originally planned Testbed training modules and summarizes the revised scope for the Testbed. It is anticipated that validation of the training materials will occur during the two months prior to Testbed deployment at GSFC. Two-week training presentations for Testbed operations and maintenance are planned to start with the Testbed deployment at LaRC and NSIDC. Presentations at EDC will start one week after Testbed deployment. The milestone schedule for these validations and presentations is included in Section 4.2.

Table 9.1-1. Training Modules

Module Topic	Scope for Testbed
Introduction and System Overview	Reduced to reflect Testbed focus on SSI&T of AM-1 and SAGE III science software, interface testing, and related support activities
Problem Reporting	Reflects Trouble Ticket capability for operation and maintenance of the Testbed and to support its functions
System Administration	Reflects Testbed configuration and functions, security
Network Administration	Reflects Testbed configuration and functions, remote access for SSI&T via NSI and/or dial-up terminal server
Production Planning and Processing	Reflects comprehensive SSI&T support including entering production requests, developing and activating a production plan, scheduling and monitoring jobs with the AutoSys COTS, managing PGE execution, and QA monitoring of products
Database Administration	Reflects Testbed functionality and databases
Configuration Management	Reflects Testbed implementation and maintenance, including application of change and baseline management tools
Science Software Integration & Test	Reflects Testbed emphasis on SSI&T functions, focus on AM-1 and SAGE III instrument SSI&T process and activities; includes registering PGEs
System Troubleshooting	Reflects Testbed maintenance and operations activities, use of available tools (e.g., HP OpenView, Log Browser)
Software Maintenance	Reflects Testbed maintenance and operations activities, use of available tools (e.g., HP OpenView, ClearCase, DDTS, Log Browser)

10. Documentation

10.1 Documentation

Documentation requirements previously required for Release A CSR and RRR have been examined with the intent to identify those documentation and procedures necessary to operate and maintain the Testbed. Except where noted these documents will be delivered as technical papers or white papers (not CDRLs). Revision control will remain with the Testbed M&O group while the Testbed is use. Table 10.1-1 lists the documentation.

Table 10.1-1. Pre-Release B Testbed Documentation

Title	Type	Planned Availability Date	Responsibility
Software Developer's Guide to Preparation, Delivery Integration and Test with ECS	205 Volume 4 Document - Already delivered - 2/97 Contains developer's guide to Science Software for Science Users (Instrument Teams)	Done	SDE
SSI&T Green Book	Documentation for "as-built" object models for testbed software	May 97	SDE
Testbed Object Software Models	Contains documentation for 'as-built' reverse engineered software for Testbed functionality	July 97	Testbed Dev
Testbed Database Listings	Testbed database scripts, tables,, schema by database by site	July 97	Testbed Dev
Testbed Test Plan and Procedures	Includes description of test plans used for Testbed Verification as described in Section 4.	April 97	I&T
Testbed Tools Manual	Operations Tools available in the Testbed	May 97	Testbed Dev
Mission Operations Procedures	Testbed Operations Procedures	April 97	M&O
ECS Training Plan	622 Document - Already delivered - 10/96	Done	DMO
Testbed Training Material	Training Documentation as described in Section 9	April 97	M&O

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Abbreviations and Acronyms

ASCII	American Standard Code for Information Interchange
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
CI	Configuration Item
CM	Configuration Management
COTS	Commercial Off-The-Shelf (hardware or software)
CSDT	Computer Science Data Type
DAAC	Distributed Active Archive Center
DAP	Delivered Algorithm Package
DB	Database
DDTs	Distributed Defect Tracking System
DEM	Digital Elevation Model
DLL	Dynamic Link Library
DPR	Data Processing Request
ECS	EOSDIS Core System
EDC	EROS Data Center (DAAC)
EOSDIS	Earth Observing System Data and Information System
EROS	Earth Resources Observation System
ESDIS	Earth Science Data and Information System
ESDT	Earth Science Data Type
FTP	File Transfer Protocol
GSFC	Goddard Space Flight Center (DAAC)
GUI	Graphical User Interface
HDF	Hierarchical Data Format (NCSA)
HTML	Hypertext Markup Language
I&T	Integration and Test
IDL	Interactive Data Language
I/F	Interface

IT	Instrument Team
LaRC	Langley Research Center (DAAC)
M&O	Maintenance and Operations
MCF	Metadata Configuration File
MISR	Multi-Angle Imaging Spectroradiometer
MODIS	Moderate Resolution Imaging Spectroradiometer
MOPITT	Measurements of Pollution in the Troposphere
MS	Microsoft®
NCR	Non-Conformance Report
NSIDC	National Snow and Ice Data Center (DAAC)
ODL	Object Description Language
PDF	Portable Document Format
PDPS	Planning and Data Processing System
PGE	Product Generation Executive
PH	Production History
PLANG	Planning subsystem (CI)
PR	Production Request
PRONG	Processing subsystem (CI)
QA	Quality Assurance
SAGE III	Stratospheric Aerosols and Gas Experiment III
SCF	Science Computing Facility
SDE	Science Data Engineering (ECS)
SDP	Science Data Processing
SEO	Sustaining Engineering Organization
SGI	Silicon Graphics, Inc.
SSI&T	Science Software Integration and Test
TBD	To be determined
TT	Trouble Ticket, Trouble Ticketing